

FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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EDITORIAL COMMENT.

As we write, nearly a week has elapsed since Mr. Gustav Hamel vanished during his attempt to cross the Channel without any single clue to his fate being discovered. With the deepest regret, therefore, we are forced to the conclusion, in spite of the extraordinary report current on Wednesday evening of his having been rescued, that he has met the fate which overtook Mr. Cecil Grace and Mr. Allen when attempting overseas flights under rather similar conditions. Whether he was wise to tempt Providence by essaying the flight with weather conditions which were against him and with an engine which had admittedly been giving trouble is rather beside the point now. If he did indeed err, he has paid the penalty that has been exacted of brave men right down through the centuries. His loss—for loss we fear it is—is one that is well-nigh irreparable to British aviation, for without doubt he was one of our best aviators, and we have not so many good men that we can afford to lose them in this way. But apart altogether from these considerations, heavily though they weigh, we have to deplore the passing from amongst us of a man of singular charm of manner, modest in spite of his great achievements, and one who had made hosts of friends among those intimately, or even remotely, connected

with the movement. The manner in which he was regarded by those with whom he came into contact is eloquently indicated by the tribute paid to his memory by the Admiralty, in announcing that it had been reluctantly decided to abandon the hopeless search in which a number of His Majesty's ships had been engaged for a full two days. The official communication reads:—

"It has been decided to suspend the searching operations by flotillas and aircraft, which have been in operation for the last forty-eight hours, for Mr. Gustav Hamel.

"In relinquishing this quest, the Admiralty desire to place on record their recognition of the services rendered to British aviation by the missing airman. He was without question the foremost exponent in these islands of an art whose military consequence is continually increasing.

"His qualities of daring, skill, resource, and modesty merited the respect of those who pursue the profession of arms; and his loss, if this must be accepted, is received with deep regret by the officers and men of the Naval Wing of the Royal Flying Corps."

In all our experience we do not remember having seen an official tribute like this paid to a civilian. After this, there is no need for us to add more than our own tribute to his memory and the expression of our deep sympathy with his sorrowing relatives in their bereavement—the more sad since it was so unexpected.

Theory and Practice.

At the last meeting of the Aeronautical Society, Dr. Glazebrook delivered the Wilbur Wright Memorial Lecture, entitled "The Development of the Aeroplane," in which he indicated the character of some of the work conducted at the National Physical Laboratory on the problem of Stability of Aeroplanes; and we feel confident that very few of those present failed to realise that the information he had imparted showed that a fresh stage of development in aeroplane construction had been reached—the possibilities of which it is extremely difficult to accurately estimate. The occasion was peculiarly appropriate. The Aeronautical Society is recognised as the leading body in this country concerned with the furtherance of the scientific side of aviation, and the results recorded were achieved by some of its members. The early successes of the Wright brothers were attained through the adoption of systematic methods of working, careful study, and an infinite capacity for taking pains; and although they were not the first to rise into the air in a heavier-than-air machine, their public appearance marked the conversion of

mechanical flight from a dangerous undertaking into one of comparative safety.

R.E. 1, to which the lecturer referred, is not the first inherently stable aeroplane—to say that it is would be to disparage the work which has been carried out by constructors in this and other countries by such men as Dunne, Handley Page, D.F.W., &c.—but it is the result of long-continued and patient experiment with models at the National Physical Laboratory and with full-size machines at the Royal Aircraft Factory, that association of theory and practice—co-operation between engineers engaged in experimental work and those who design the machines—which has been repeatedly advocated in these columns. R.E. 1 is remarkable, and stands for what we believe it does—the commencement of a new era in aeronautical design—because it exhibits no radical departure from accepted lines of development, neither stabilising mechanism nor specialised construction being employed. In appearance, it resembles the later B.E.'s. excepting that the triangular fin in front of the rudder is of larger dimensions, the wing section has been improved, the body has somewhat finer lines, while there is only one pair of struts between the planes on each side. These are, however, details which are common to many machines, and have been introduced for the purpose of increasing the efficiency of the machine. The inherent stability of R.E. 1 is due *only* to the adoption of a dihedral between the planes of suitable magnitude, and correctly proportioning and locating the various surfaces—all of which have been calculated with infinite care—in accordance with experimentally determined values. Hence there is no reason why every manufacturer should not be able to build machines possessing an equal degree of stability, as the methods employed can be adapted to the design of any aeroplane. The beneficial effect upon the pilot of such machines, especially on long distance flights, need only be mentioned as the reduced physical and mental strain involved in their control is readily apparent.

It is not too much to say that the fact that an aeroplane of a standard type has been designed from data experimentally obtained in an aerodynamic laboratory has given to aerial transit a huge impetus; that the earnest desire of every serious student and believer in the future of aeronautics—the application of the aeroplane to commercial purposes, the carrying of passengers, mails, &c.—is within measurable distance of consummation; and the confidence which such an event inspires in the layman renders it *possible* that within a comparatively short time we may have services of aeroplanes in active operation in many parts of the world.

The Advisory Committee Report.

The much-belated Annual Technical Report of the Advisory Committee has at length come to hand. We use the term "much-belated," not because it has been published eighteen months after its immediate predecessor, but because an examination of the dates attached to the memoranda reveals the fact that, with the exception of Dr. Rosenheim's Report on Light Alloys (September, 1913), all were presented not later than March of last year, fifteen months ago!—many were prepared in 1912, and one by December, 1911. We are fully aware that work of this character, which is accepted without question the world over, requires thoroughly checking; but if the dates count for anything, they should indicate the time at which the tests to which they refer were complete and had been verified, and if our assumption

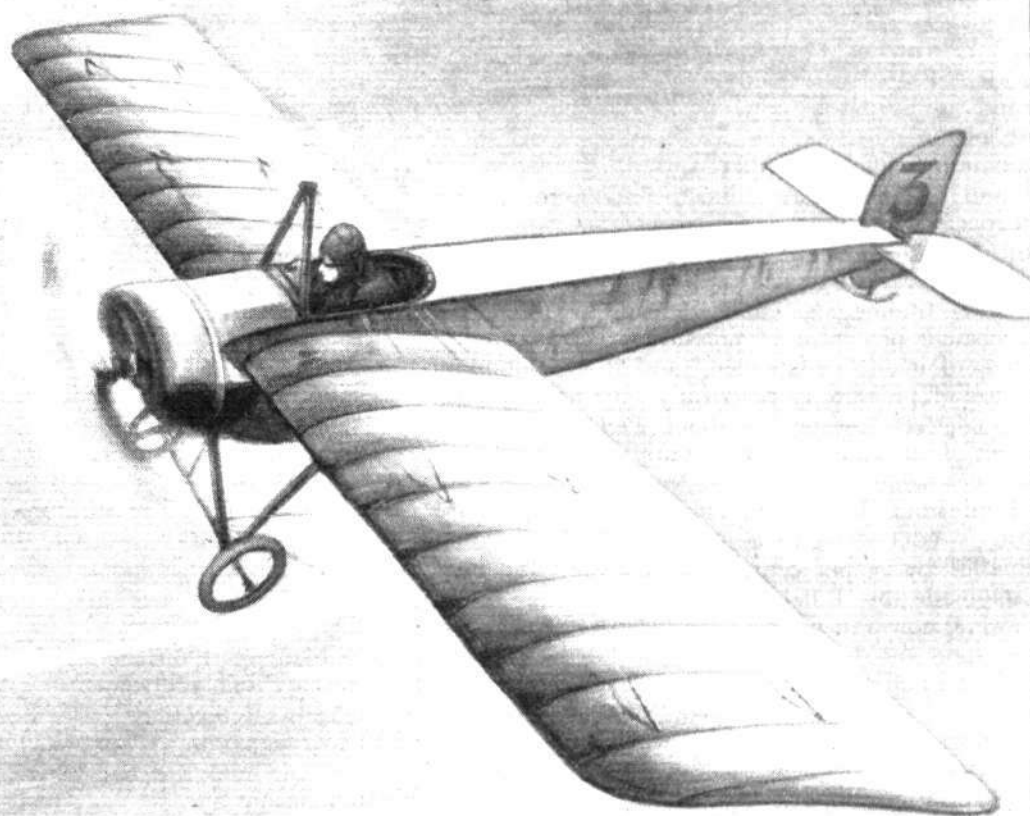
be correct we consider that this delay represents so much loss of time, which, at the present state of aeronautics, is much to be deplored. It is to be hoped that subsequent reports will be issued at a much earlier date or that means will be devised whereby manufacturers and others interested in the experimental work conducted at the N.P.L. and the R.A.F. may be made acquainted with the results obtained at these establishments.

The high standard of excellence obtained in the previous reports has been well maintained, and will prove equally, if not more, valuable to designers and others. Much new ground has been broken, notably in regard to aerofoils, wind forces and moments on parts of aeroplanes, stability, the calculation of stresses in wing spars and in the fabric, wind forces on hydroplane floats, and the properties of light alloys; while a considerable amount of other research has been carried to a further stage of completion. It will, therefore, be evident that the Report now under notice represents a most comprehensive examination of many of the more pressing problems that now await solution, and although some parts are highly technical in character, the greater part of the matter can be perused with profit and pleasure by the most casual reader. Much help in this respect is afforded by the large number of graphs presented, which form, as in previous volumes, an important portion of the work.

Space precludes any possibility of dealing adequately with the subject-matter of this volume, and we shall therefore confine our comment, principally, to the covering letter to the First Lord of the Treasury, which is signed by the President of the Committee, Lord Rayleigh.

With the exception of research on the determination of the lifting power of samples of hydrogen, the leakage of gas through, and the proofing of balloon fabrics, no experimental work in connection with airships is recorded; although it is stated that some tests have been made on the resistance of airship models in the William Froude National Tank, which more immediately pressing questions have prevented from continuance. These experiments form an extension of the work carried on last year, and refer especially to the determination of the conversion factor when passing from the model to full scale results.

The results obtained in the aerofoil experiments are of an extremely interesting character. Previous work, as is well known to readers of FLIGHT, has indicated that the efficiency of a wing is mainly determined by the camber of the top surface, the under surface being relatively unimportant. In the present report the effect of varying the position of the maximum ordinate while keeping the camber constant is recorded; and as the lift curves of many wing sections drop rapidly when a certain angle of attack is reached, it was considered desirable to reduce this decrease in lift as much as possible, and to increase the angle at which it occurred to as large a value as possible. This, it has been found, can be effected with an aerofoil having a camber of 1 in 20, by changing the position of the maximum ordinate, the best position being at a distance from the leading edge of about three-eighths of the chord. In this position, the lift maximum extends, with little diminution, over a considerable angular range, although a slightly higher value of lift to drift was obtained when the position of the maximum ordinate was moved to about one-third of the chord from the leading edge, but with the attendant disadvantage that there was some possibility of re-introducing the sudden drop in lift. Further experiments conducted in this direction, had as their object to ascertain to what extent the aerofoil could



Roderic Hill

A MEMORY.—Mr. Gustav Hamel, whose disappearance since Saturday has caused such widespread sorrow, flying his Morane monoplane on which he has accomplished such daring feats during the past months. From an original drawing by Roderic Hill.

be thickened towards the trailing edge in the vicinity of the rear span without impairing its aerodynamic properties. This was considered to be of importance from the point of view of construction, and as a result the wing section known as the R.A.F. 6 was selected. This wing is abnormally thick, being almost flat on the underside, while the upper surface has very little camber between the wing spars, and resembles somewhat, so far as memory serves us, the wing section of the Bristol Scout exhibited at the last Olympia Show and described in detail in *FLIGHT* for April 26th last. It gave with an aspect ratio of 6 to 1 a lift coefficient (absolute) of 0.32 at 5°, with a maximum ratio of lift to drift of 14.3, the maximum lift coefficient being 0.6 at 15°.

In regard to the effect of wing warping, it is interesting to note that the observations made in the course of experiments on an aerofoil of the form R.A.F. 6 showed that there was no loss of lift and a negligible amount of movement of the centre of pressure, as the result of warping through a maximum angle of 6° (that is, the angle between the front and rear spars) at ordinary flight angles; but, as was expected, the drift was increased, thereby reducing the lift/drift ratio to 12.2. Research was also conducted to ascertain "the extent to which a reflex curvature towards the trailing edge could be made to neutralise the rapid change of centre of pressure which occurs when the angle of incidence is varied," and it was found that the centre of pressure is practically stationary when the trailing edge is elevated by about 0.037 of the chord, the point of inflexion from which the reversed curvature commences being "anywhere between 0.2 and 0.4 times the chord from the trailing edge," but the maximum lift/drift is reduced by 12 per cent., and the maximum possible lift by 25 per cent. This confirms the results of tests made by Eiffel on a different wing section, which were, however, not so extended.

The report on the experiments on the determination of the forces and moments on aeroplane bodies, as well as a model of a complete aeroplane; forces on struts, of varying fineness ratio, and wheels, when inclined to the relative wind; and the resistances of wires form a valuable contribution to our knowledge on the subject, especially in connection with the examination of stability problems. The work carried out, some of which is in the preliminary stage only, is of an extensive and varied character, which renders it impossible to do more than mention it here; but we hope to refer to some of the results obtained on a future occasion.

Messrs. Bairstow, Melville Jones and Thompson contribute a Memorandum relating to the stability of an aeroplane, and although it is invidious to make distinctions, they are to be congratulated upon the results obtained. This work is, naturally, of a more or less mathematical and complex character, but even so, there is much that can be learned without rigidly following the mathematical treatment accorded to the subject. The investigation applies the results of the theories developed by Lanchester and Bryan—supplemented by the latest information available as to the wind forces acting upon a machine in flight—to actual aeroplanes, and includes some original work, the object of much of which is directed to reducing the labour involved in calculations relating to stability and to a comparison of certain approximations with more accurate solutions. It will be readily conceded by everyone that the subject is extremely extensive, and the tests, so far, on the determination of the essential

factors on which stability depends have been carried out on complete machines; but experiments have already been commenced which should provide data for the designer as to the effect of all the component parts and their mutual interference upon one another. The degree of stability which a machine should possess is also a question that calls for examination, but it is suggested by the Committee that its stability factor should not be too great.

Another important memorandum bearing on the same subject relates to the effect of a side wind upon a propeller, and is an original contribution by Mr. T. W. K. Clarke, in the course of which he shows that a propeller, under some circumstances, may have a most marked fin effect, and conduce to directional instability, as, for example, when placed far forward in a tractor machine. The Superintendent of the R.A.F. presents a report which gives particulars of the measurements and calculations made to determine the amount of the effect due to gyroscopic action of rotating engines and propellers, and arrives at conclusions which are now generally accepted for the conditions assumed, namely, that the couple due to gyroscopic action is no more than can be readily taken up by the structure upon which the parts are mounted, and that the effect is well within the control of the pilot.

As stated in *FLIGHT* some weeks back, the Report gives a method of calculating the stresses in the wing spars of aeroplanes by the application of the theorem of three moments. This we regard with special interest, because the usual pin joint hypothesis may under some conditions be subjected to appreciable error in practice, and any attempt to arrive at a more exact knowledge of the actual stress is to be heartily welcomed. The method of working is fairly fully developed, and indicates the method of treatment that should be followed under certain conditions which may arise from various causes during flight.

The report on the year's work at the Royal Aircraft Factory will probably prove of more general interest, because it records, amongst other work, the results of experiments on full-size machines as distinct from tests on scale models. Particulars are given of the principal dimensions and performances of different types of aeroplanes—the R.E.1, S.E.2, F.E.2, and F.E.3; and it is worthy of notice relative to B.S.1—a high speed single-seater scout—that when fully loaded for 3 hours' flight the average speed was 91.7 miles per hour, the slow speed 51 miles per hour (which it is expected might be improved upon), and the rate of climbing 900 ft. per min. Much work, notably in the direction of stability and control, is indicated, of which the results are published; but at the time of presentation of the Report there were many problems still under, or requiring, further investigation.

In addition to many other matters, the Report continues the results of tests on aeroplane fabrics, which should prove of considerable value to constructors, as the effects of dopes and exposure upon their strength have been very severely examined. Light alloys have also received attention.

The whole work, which covers 400 pages, is, as can be readily seen from the brief outline we have given, of the highest possible value to all readers of *FLIGHT*; and the fact that the experiments upon which the reports are based were completed so far back and yet have lost little or nothing in value, reflects great credit upon all concerned.



Queen Alexandra with the Dowager Empress of Russia watching the flying at Hendon on Saturday last, when the Royal party motored to Hendon with the object of seeing the Aerial Derby, which, unfortunately, owing to the weather, had to be postponed.

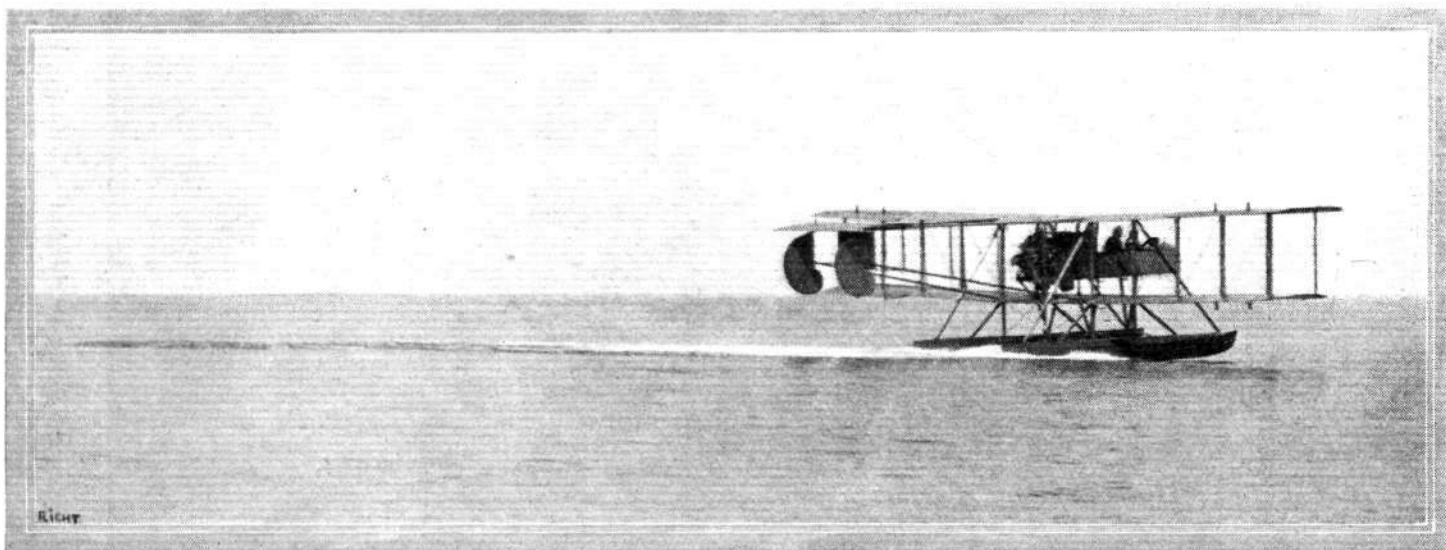
THE "WIGHT" SEAPLANE.

AMONG the ever-increasing number of British seaplanes, few have met with greater success than have Wight seaplanes designed by Mr. Howard T. Wright and built by Messrs. J. Samuel White and Co., Ltd., of Cowes. The excellent performances of these machines are somewhat apt to escape the notice that they certainly merit, since they are at present built for the British and foreign navies only and their flights in public have been limited to trial flights and delivery tests. There is no lack of recognition by our own and foreign governments, however, and several of these machines have already been delivered, whilst sufficient orders have been received to keep the firm very busy indeed for a long time to come.

One of these machines was, it will be remembered, exhibited at the last Olympia Aero Show when it caused considerable interest owing to its many original features. Most notable among these are the unusually long floats, and the peculiar double camber on the upper surface of the wings. It is undoubtedly chiefly due to this double camber that the machine possesses such a good speed range—from 78.9 miles per hour to about 35 m.p.h. with full load of fuel, wireless apparatus, pilot and passenger. The

bank up to the right degree in making a turn without any use of the *aileron*s, and when flying in a straight line, even on a windy day, the *aileron*s are rarely called into play.

Excellent as is the behaviour of the machine in the air, her performances when on the sea are almost even more so. The long three-stepped floats leave the water in a perfectly clean manner, without the huge spray of water usually set up while a machine is gathering speed. The nose of the floats leaves the water first, then the first step, and so on, until gradually the whole of the floats leave the water without any jerk whatever. When starting for a flight in a rough sea, the long narrow floats plough their way through the waves without causing the machine to rise and sink with the swell. Alighting on the water is effected by throttling down the engine until a sufficiently low flying speed has been obtained to allow of settling down on the surface of the sea gently and without shock. One of the accompanying photographs shows in a most striking manner the clean wake of the floats under these conditions. When taxiing on the surface of the sea the



The "Wight" seaplane alighting. This photograph gives a good idea of the small wake set up by the long narrow floats.

most marvellous point, however, does not so much lie in the speed range itself, although that is uncommonly good, but more in the attitude of the machine throughout the entire range of speeds. The main planes and the tail plane are so designed that as the speed of the machine increases, the lift of the tail plane increases at a different ratio from that of the main planes, in such a manner that, as the speed goes up, the angle of incidence of the main planes in relation to the horizontal decreases without necessitating use of the elevator. When the maximum speed has been reached, the main planes are flying at a negative angle of incidence of 1° , whilst the tail plane has a negative angle of incidence of 4° . Any attempt to increase the speed beyond this point causes a top pressure on the tail plane and the machine begins to climb. It will therefore be seen that it is possible to fly the machine simply by closing or opening the throttle without using the elevator, as longitudinal stability is perfect under all speeds.

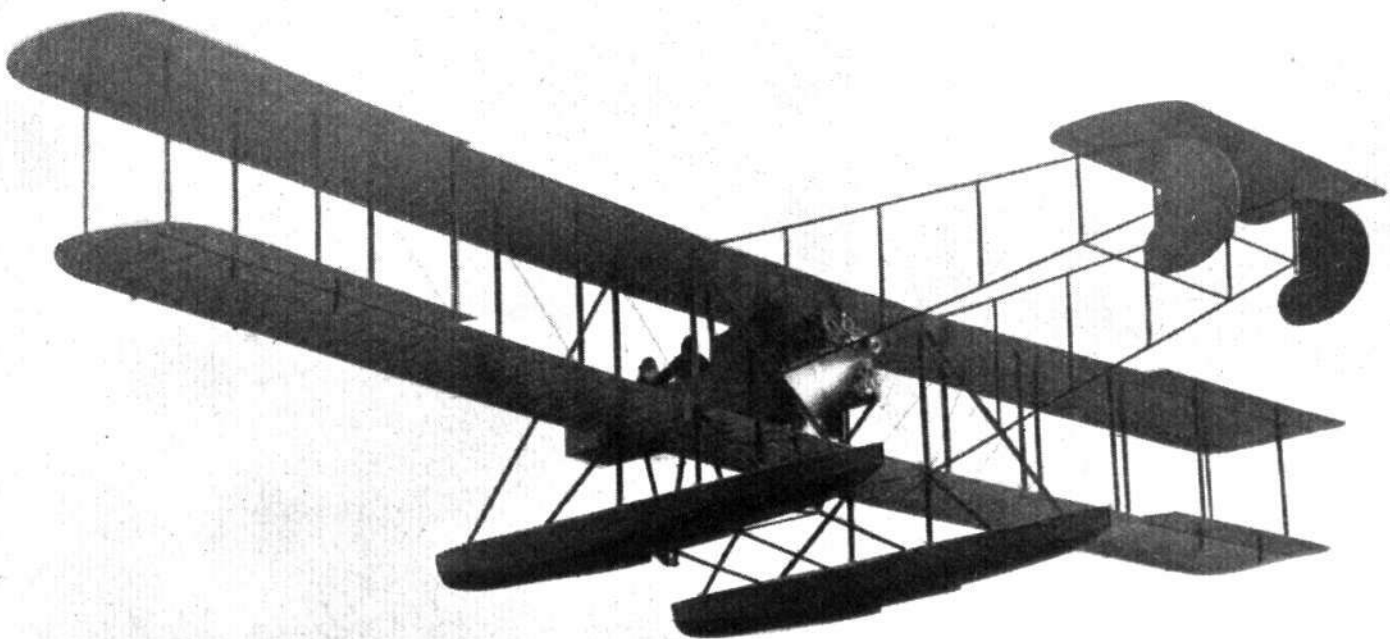
The lateral stability is more difficult to explain, but is none the less pronounced. We had occasion recently to observe the machine in flight, and she appears to

machine answers her rudder beautifully, and it is possible to make a complete circle of only about 30 ft. diameter. With a full load including fuel, wireless apparatus, pilot and passenger, the machine reaches an altitude of 3,000 ft. in $7\frac{1}{2}$ mins., and recently experiments were made with an additional load of 400 lbs., with which the machine reached 3,000 ft. in $13\frac{1}{4}$ mins. By sacrificing the low starting and alighting speed, a much greater load could be carried, but Mr. Howard Wright is—rightly we think—in favour of a machine possessing a wide speed range.



The Progress of the Montrose Squadron.

Up to the end of last week the officers of the Montrose Squadron of the R.F.C. who are flying south had reached Lincoln. Another stage was completed on Tuesday, when eight of the machines reached Chapel Brampton, near Northampton. The weather was very cold, and a snowstorm was encountered. The officers who made the trip were Major Burke, Capt. Todd, Capt. Dawes, Capt. Waldron, Lieut. Harvey-Kelly, Lieut. Dawes, Lieut. Corballis and Lieut. Martyn. Last week Capt. Waldron and Lieut. Harvey-Kelly returned to Montrose, and started on the afternoon of the 19th inst. to fly south on two fresh machines to replace those damaged at York.



The "Wight" seaplane in flight.

RIGHT

FLYING AT HENDON.

THURSDAY of last week was fine and breezy and a good afternoon's flying was put up by the Hendon pilots. In the morning, W. R. Ding, accompanied by Princess Ludwig of Lowenstein-Wertheim, left for France on the 100 h.p. Handley Page biplane, arriving at Eastbourne at noon, after which he flew on to Calais *via* Dover, taking about 15 mins. to cross the Channel, his total flying time for the journey being 1 hr. 50 mins. Just as R. H. Carr was opening the proceedings shortly before 3.30 p.m. with a flight on the G.-W. tractor biplane "Lizzie," Lieut. Horden of the R.F.C. started for Farnborough, whence he had flown earlier in the day, on Henry Farman No. 244. Whilst Carr was executing numerous spirals on "Lizzie," W. Birchenough ascended on the G.-W. bi-rudder 'bus, and after completing several circuits of the aerodrome he stopped his engine and glided to earth with the propeller stationary. This method of descending is very popular just now, and it is certainly both spectacular to look at and extremely pleasant to experience. R. J. Lillywhite next took over the bi-rudder 'bus, and climbing high, descended with a spiral *vol sans force*. Carr then took up two passengers on the 100 h.p. five-seater aerobus, and Louis Noel brought out the resurrected Maurice Farman, which, although low in the tail, is still flying, like Charley's Aunt. Two passenger flights were then made by Lillywhite on the bi-rudder 'bus, whilst F. W. Goodden put up a fine 25 mins. flight on the 80 h.p. Morane-Saulnier. Carr also ascended and gave a looping display on "Lizzie," making two complete loops at heights of about 1,000 and 800 ft., after which Noel and Goodden each took up a passenger on the Maurice Farman and the Morane-Saulnier respectively. Goodden then took a 'busman's holiday and went for a flight as passenger on the Maurice Farman with Noel, who executed various evolutions and finished up with a *vol sans force*. Birchenough made the next flight on the bi-rudder 'bus, Carr following shortly after with four passengers on the aerobus, Claude Grahame-White ascending the meanwhile on "Lizzie." At 6.25 p.m. Gustav Hamel arrived from



Mr. C. F. Lan-Davis in the Avro at Hendon.



The crowd at Hendon on Aerial Derby Day, as seen looking left from the Judges' box.

Cambridge on the 80 h.p. Morane-Saulnier with Baron de Gunsberg as passenger, having taken 45 minutes to complete the journey.



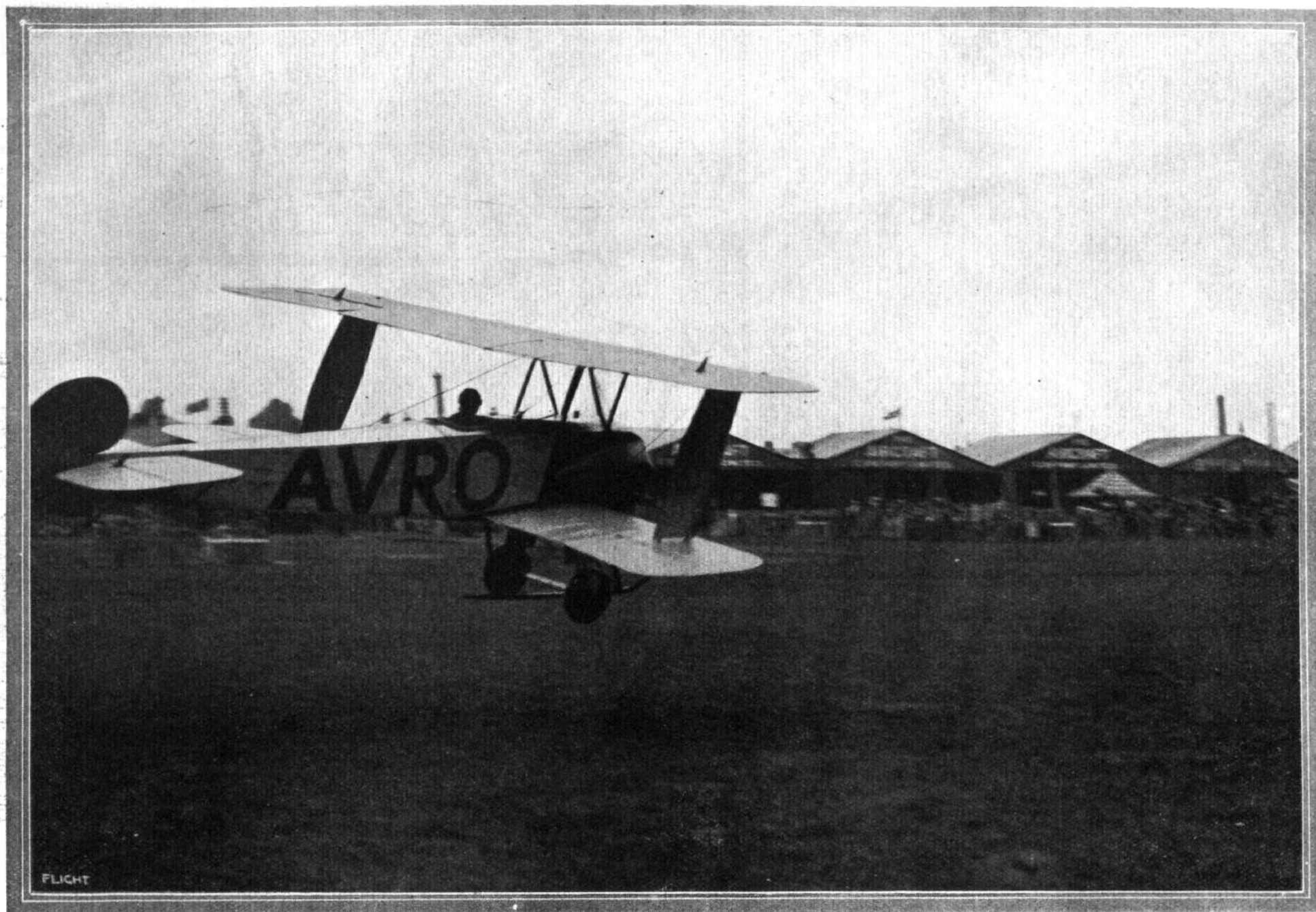
Mr. R. Skene in the pilot's seat of Lord Edward Grosvenor's Blériot.

Immediately after he made two passenger flights, a lady accompanying him on his second trip, during which he chased the aerobus which Carr was piloting the meanwhile with three passengers. After this the proceedings were brought to a close and school work started, but later in the evening Goodden took up a lady passenger on the Morane.

After several weeks of fine summer weather, that gave promise of ideal conditions for the Aerial Derby, it was bitterly disappointing to get such a sudden change to bad weather, causing this interesting event to be postponed, for everything looked as if it was going to be an exceptional race this year. The storm that broke over London on Friday night of last week, however, completely broke up the weather, and the day of the event, Saturday, turned out to be very unsettled and misty, altogether unfavourable for a cross-country race such as the Aerial Derby. The postponement of this event, however, was not the only cause for general resentment against the weather, for it was also undoubtedly responsible for the loss of the favourite competitor—Gustav Hamel. He had gone over to Paris on Friday at the last moment to fetch a new 160 h.p. Morane-Saulnier type monocoque specially for the race. The last that was heard of him was, all now know, that he left the French coast shortly after noon on Saturday, and as the day wore on and no news of him came, many feared the worst. On Saturday morning nine of the competing machines were on the ground, Howard Pixton arriving from Brooklands shortly before 11 a.m., having taken about 12 mins. to complete the journey. He reported the weather as being very bad, and the ground was so misty that he could not locate Kempton Park when he flew over, although he was not more than 600 ft. high. At noon Louis Noel made a test flight on his 80 h.p. Morane-Saulnier, after which a terrific rain storm prevented any further flights from being made until nearly 3 o'clock, when Noel again went up, this time on the Maurice Farman with a passenger. Carr on "Lizzie" and J. L. Hall on his 50 h.p. Avro came out immediately after, and F. P. Raynham followed with a test flight on the 80 h.p. Avro Arrowplane which showed a clean pair



The crowd at Hendon on Aerial Derby Day, as seen looking right from the Judges' box.



Mr. Raynham, in the Avro scout, just getting off at Hendon Aerodrome.

of elevators, although it must be admitted that it was not so speedy as was expected. After flights by Birchenough on the bi-rudder 'bus, and Claude Grahame-White on the Maurice Farman, Pixton came out on the Sopwith. He put up several circuits at a remarkable speed which caused no small amount of excitement amongst the spectators, but on landing the chassis collapsed just as the machine was about to come to rest, causing it to swerve towards the enclosure. Fortunately the machine came to a standstill some 20 or 30 yards from the latter, and as far as could be seen all the damage done was a broken skid. It was a bit of hard luck

which might have put Pixton out of the race, for it was still undecided as to whether the race would be flown or not, and Pixton had many sympathisers. However, mechanics were soon at work effecting a repair. Two more competitors came out and made trial flights, P. Verrier on the 70 h.p. Maurice Farman, which he was to fly instead of the Henry Farman, and W. R. Ding, who had returned to Hendon from France on Friday, on the 100 h.p. Handley Page biplane; R. J. Lillywhite also made a flight at the same time on the bi-rudder 'bus. By this time it was nearly 4 o'clock, and, whilst Noel was executing startling banks on the Maurice Farman, Queen Alexandra, with the Dowager - Empress of Russia, arrived in her motor car, having entered the aerodrome at the far end near the railway. Her Majesty, who was received by Mr. Grahame-White, stayed for nearly an hour, and witnessed several excellent exhibitions of flying. Goodden ascended on the 60 h.p. Caudron, and, climbing to a height of about 800 ft., executed a perfect loop, then making a circuit to regain his former altitude, he made a second one, and then a third at about 1,000 ft., after which he descended with a series of spirals. Lord Carbery

next gave an exhibition of looping on his 80 h.p. Morane-Saulnier, making three loops amongst the clouds. Verrier then ascended on the Maurice Farman, and put up some switchbacks and wiggle-woggles, after which Grahame-White on the other Maurice Farman, Raynham on the Avro Arrowplane, and Noel on the 80 h.p. Morane-Saulnier all went up together, Goodden following shortly after on his 80 h.p. Morane, and climbing above the clouds where he was lost to view several times. An announcement was then made that it had been decided to postpone the Aerial Derby owing to the unfavourable state of the weather until Saturday, June 6th. Some further flights were made by Carr on "Lizzie," Noel with a passenger on the Maurice Farman, J. L. Hall on his 50 h.p. Avro, Lord Carbery and Goodden on the Moranes, Goodden taking as passenger Mr. V. W. Eyre, who took his pilot's certificate some two years ago at Buc.

The day's proceedings were wound up with a four-lap speed handicap, which resulted in a very close finish, so that the 35,000 spectators at the aerodrome itself had an excellent show if they did not see the start and finish of the Aerial Derby. Grahame-White who started first maintained his lead until the end of the last lap, where he was overhauled by Noel, who had made a fine effort from scratch. The result was as follows:—

Speed Handicap. (4 laps).

	Handicap.	Time.
	m. s.	m. s.
1. Louis Noel (80 h.p. Morane-Saulnier) ...	scratch	7 59
2. C. Grahame-White (70 h.p. M. Farman) ...	1 57	8 4
3. P. Verrier (70 h.p. Maurice Farman) ...	1 25	8 16
4. R. H. Carr (50 h.p. G.-W. tractor biplane) ...	1 10	8 25
5. F. W. Goodden (60 h.p. Caudron) ...	1 48	8 31

Amongst the visitors on Saturday were Lady Juliet Duff, Lady Diana Manners, Lady Vita Perry, Lord and Lady Curzon, Lord

Herbert Vane Tempest, the Duke Villa Rosa, Prince Potenziani, Prince Lichknosky, the Bishop of Glasgow, Sig. Marconi, &c. Capt. Thomas S. Baldwin, who made several parachute displays in England some twenty years ago, and who afterwards started an aeroplane and dirigible factory in the U.S.A., was also an interested spectator of the flying at Hendon during the week-end.

Some thirty exhibition flights were made at the aerodrome on Sunday in dull and windy weather. About fifteen of these flights were with passengers, one of whom was Signor Caruso, who made his first flight with Claude Grahame-White on the Maurice Farman. The pilots who contributed to the afternoon's flying were:—W. Birchenough on the bi-rudder 'bus, Lord Carbery on his 80 h.p. Morane-Saulnier, R. H. Carr on "Lizzie" (on which he made two loops at a height of 1,000 ft.), and the 80 h.p. Blériot, F. W. Goodden on the 80 h.p. Morane-Saulnier, C. Grahame-White on the Maurice Farman and "Lizzie," N. Howarth on the bi-rudder 'bus, J. L. Hall on his 50 h.p. Avro, R. J. Lillywhite on the bi-rudder 'bus and Louis Noel on the Maurice Farman.



Queen Alexandra and the Dowager Empress of Russia were particularly interested in Mr. Goodden's looping the loop at Hendon on Saturday last.

The London-Manchester-London Race.

ARRANGEMENTS are now well forward in connection with the one-day race from London to Manchester and back, which is to be held on Saturday, June 20th. The competitors will leave the Aerodrome at Hendon at intervals between the hours of 9 a.m. and 12 noon, and after a stop of one hour at Manchester will return to Hendon in time for the winner to arrive shortly after 5 o'clock. It is probable that a control will be established at Birmingham.

The prizes are the *Daily Mail* Gold Trophy, which will be a model in gold of the winner's machine; and the "Pratt's" Trophy and £750 offered by the Anglo-American Oil Co.—the distributors of "Pratt's" Motor Spirit—in celebration of the Anglo-American Peace Centenary. Full details of the rules and route will shortly be announced.

The Aerial Derby.

As we have recorded elsewhere, owing to the state of the weather the Stewards at Hendon on Saturday last decided that the Aerial Derby should be postponed, and it has now been decided that the race shall be held on Saturday, June 6th, over the same course as originally proposed, starting at 4.15 p.m. The entry list has been reopened and entries will be accepted up to midday on Monday next. Numbers allotted for last Saturday may be altered.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Diary of Events.

- May 30 ... } Whitsun Flying Meeting. Hendon Aerodrome.
 June 1 ... }
 June 6 ... Aerial Derby. Hendon Aerodrome.
 June 10 ... Balloon Race. Hurlingham Club, Fulham, S.W.
 June 27 ... Balloon Race. Hurlingham Club, Fulham, S.W.
 July 11 ... International Correspondence Schools Race,
 London-Paris-London. Hendon Aerodrome.
 July 11 ... Balloon Race. Hurlingham Club, Fulham, S.W.
 Aug. 1-15 *Daily Mail* £5,000 Circuit of Britain Race. Start-
 ing from Southampton Water.
 Aug. 22-29 Gordon-Bennett Eliminating Trials. Salisbury
 Plain.
 Sept. 20-29 Gordon-Bennett Aviation Race. Buc, France.

HENDON AERODROME.

Members of the Royal Aero Club are admitted free to the Hendon Aerodrome on presentation of their Club Membership Cards. The Membership Card admits the Member only, motor cars must be paid for.

Balloon Contests at Hurlingham.

The Club has arranged the following Balloon Contests from Hurlingham Club, Fulham, for this year:—

- June 10th... Hare and Hounds Race for Cup presented by Mr. John Dunville.
 June 27th... Long Distance Balloon Race for Cup presented by Mr. A. Mortimer Singer.
 July 11th... Hedges Butler Challenge Cup.

Members are admitted free to Hurlingham on the above dates, on production of their Club Membership Cards.

Daily Mail Circuit of Britain Race, £5,000.

- Date of Contest ... August 1st to 15th.
 Starting Place ... Southampton.

Entries.—The Entrance Fee is £100 per aircraft, and entries will be received up to 12 o'clock noon, May 30th, 1914. The Entrance Fee of £100 is payable either in one sum or as follows:—

- £50 by noon on May 30th, 1914.
 £50 by noon on June 20th, 1914.

Late entries will be received up to 12 noon, June 30th, 1914, in which case the Entry Fee will be £150.

The Entry Form, which must be accompanied by the Entrance Fee, must be sent in to the Secretary, Royal Aero Club, 166, Piccadilly, London, W.

Full particulars can be obtained from the Secretary, Royal Aero Club, 166, Piccadilly, London, W.

Mr. Gustav Hamel.

No news having been received of Mr. Hamel since he left Hardelot on Saturday last to fly across the Channel, it is greatly to be feared he is drowned.

Mr. Hamel had been a member of the Club for many years, during which time he had endeared himself to all with whom he came in contact. His well-known skill as a pilot did much to further the science of flying in this country, and he will be greatly missed by all interested in aviation.

The sincerest sympathy of all members is extended to his relatives in their sad bereavement.

COMMITTEE MEETING.

A Meeting of the Committee was held on Tuesday, May 26th, 1914, when there were present:—Col. H. C. L. Holden, C.B., F.R.S., in the Chair, Mr. Griffith Brewer, Mr. Ernest C. Bucknall, Prof. A. K. Huntington, Major F. Lindsay Lloyd, Mr. F. K. McClean, Mr. J. T. C. Moore-Brabazon, Mr. Alec Ogilvie, Mr. Mervyn O'Gorman, C.B., Mr. C. F. Pollock, Com. C. R. Samson, R.N., Mr. T. O. M. Sopwith, and the Secretary.

New Members.—The following new Members were elected:—Harold Blackburn, Jens Tryggve Herman Gran, Eng.-Lieut. Hubert John Napier-Hemy, R.N., and Hubert Walter.

Aviators' Certificates.—The following Aviators' Certificates were granted:—

- 780 Frazier Curtis (Caudron Biplane, Caudron School, Hendon). May 11th, 1914.
 (Subject to permission of Aero Club of America.)
 781 2nd Lieut. John Aidan Liddell (Vickers Biplane, Vickers School, Brooklands). May 14th, 1914.

- 782 Reginald Max Maximilian Murray (Vickers Biplane, Vickers School, Brooklands). May 14th, 1914.
 783 Michael Geoffrey Smiles (Grahame-White Biplane, Grahame-White School, Hendon). May 14th, 1914.
 784 Victor Mahl (Sopwith Biplane, Sopwith School, Brooklands). May 14th, 1914.
 785 Benjamin Herbert Piercy (Grahame-White Biplane, Grahame-White School, Hendon). May 18th, 1914.
 786 Bernard Francis Hale (Farman type Biplane, Shoreham.) May 18th, 1914.
 787 Major Edward H. Phillips (Vickers Biplane, Vickers School, Brooklands). May 19th, 1914.
 788 Capt. Alfred Garnet Moore (Grahame-White Biplane, Grahame-White School, Hendon). May 19th, 1914.
 789 Lieut. Norman Wood-Smith (Vickers Biplane, Vickers School, Brooklands). May 20th, 1914.
 790 Lieut. John Burgh Talbot Leighton (Vickers Biplane, Vickers School, Brooklands). May 20th, 1914.
 791 Lieut. Gerald Desmond Mills (Sherwood Foresters) (Bristol Biplane, Bristol School, Brooklands). May 22nd, 1914.
 792 Robert Eugene Lagrange (Bristol Biplane, Bristol School, Brooklands). May 22nd, 1914.
 (Subject to permission of Aero-Club de Belgique.)

Accidents Investigation Committee.—On the motion of Col. H. C. L. Holden, the report on the fatal accident to Lieut. Hugh Frederic Treeby was unanimously adopted and ordered to be published in extenso.

(Full report will be found following these notices).

COMPETITIONS COMMITTEE.

A Meeting of the Competitions Committee was held on Tuesday, May 26th, 1914, when there were present: Col. H. C. L. Holden, C.B., F.R.S., in the Chair, Mr. Ernest C. Bucknall, Major F. Lindsay Lloyd, Mr. F. K. McClean, Mr. N. C. Neill, Mr. Alec Ogilvie, Mr. Mervyn O'Gorman, C.B., and the Secretary.

British Empire Michelin Trophy No. 2, £800. Duration Contest.—The draft regulations were considered and approved, and ordered to be issued.

Daily Mail Circuit of Britain Race, £5,000.—The following Officials were appointed to take charge of the arrangements for the starting and finishing of the Race at Southampton:—Mr. F. P. Armstrong, Col. H. C. L. Holden, Mr. Robert Loraine, Mr. N. C. Neill, and Mr. H. E. Perrin (Secretary).

The question of the Controls and Control Officials was left to the Secretary.

Gordon-Bennett Eliminating Trials.—The following officials were appointed for the Gordon-Bennett Eliminating Trials which take place on Salisbury Plain during the last week in August:—Major W. S. Brancker, Col. H. C. L. Holden, Major F. Lindsay Lloyd, Mr. N. C. Neill, Mr. Alec Ogilvie, and Mr. Mervyn O'Gorman. Timekeepers, Mr. A. V. Ebbelwhite and Mr. A. G. Reynolds.

The selection of the course was left to Major W. S. Brancker and Mr. H. E. Perrin.

PUBLIC SAFETY AND ACCIDENTS INVESTIGATION COMMITTEE.

A Meeting of the Public Safety and Accidents Investigation Committee was held at the Royal Automobile Club (by kind permission) on Tuesday, May 26th, 1914, when there were present:—Col. H. C. L. Holden, C.B., F.R.S., in the Chair, Eng.-Lieut. E. F. Briggs, R.N., Mr. F. K. McClean, Mr. Alec Ogilvie, Mr. Mervyn O'Gorman, C.B., Major-Gen. R. M. Ruck, C.B., R.E., Com. C. R. Samson, R.N., and the Secretary.

Fatal Accident to Mr. Philippe Marty.—The draft report was considered and approved, and ordered to be submitted to the Committee.

Fatal Accident to Capt. C. P. Downer.—Lieut. W. W. A. Burn and Mr. S. Heckstall Smith attended at the invitation of the Committee and gave evidence.

The reports of the National Physical Laboratory on the various tests carried out by them were gone into, as also the reports of tests carried out by the Royal Aircraft Factory.

The report of the Accidents Investigation Committee was then drafted.

International Correspondence Schools Race. London-Paris-London.

(Under the Competition Rules of the Royal Aero Club.)
Organised by the Royal Aero Club and the Aero-Club de France.

Starting and finishing at the Hendon Aerodrome,
Hendon, N.W.

SATURDAY, JULY 11TH, 1914.

PRIZES.

Fastest Time... 1st Prize: £500. Presented by the International Correspondence Schools.

Handicap .. 1st Prize: £300. Presented by the Royal Aero Club.
2nd Prize: £150. Presented by the International Correspondence Schools.
3rd Prize: £50. Presented by the International Correspondence Schools.

Full particulars can be obtained from the Secretary, Royal Aero Club, 166, Piccadilly, London, W.

HAROLD E. PERRIN, Secretary.
166, Piccadilly, W.

ACCIDENTS INVESTIGATION COMMITTEE OF THE ROYAL AERO CLUB.

REPORT No. 22.

REPORT ON THE FATAL ACCIDENT TO LIEUT. HUGH FREDERIC TREEBY, WHEN FLYING AT THE CENTRAL FLYING SCHOOL, UPAVON, WILTS., ON THURSDAY, MARCH 19TH, 1914, AT ABOUT 10.20 A.M.

Brief Description of the Accident.—Lieut. Hugh Frederic Treeby was flying a Maurice Farman Biplane fitted with a 70 h.p. Renault engine, at the Central Flying School, Upavon, on Thursday, March 19th, 1914, at about 10.20 a.m. He had been flying about twenty minutes and was approaching the alighting-ground at a height of about 350 ft. A left-hand turn had been completed in a normal manner, apparently with the idea of landing into the wind. The engine was throttled down and the aircraft in a position for a straight glide to the ground. Suddenly, the aircraft nose-dived, fell into some trees, and was completely wrecked. The pilot, who was found underneath the engine, was killed.

Lieut. Hugh Frederic Treeby was granted his Aviator's Certificate, No. 687, on November 16th, 1913, by the Royal Aero Club.

Report.—The Committee sat on Monday, March 30th, 1914, and received the report of the Club's representative, who visited the

scene of the accident within a short time of its occurrence, together with the evidence of eye-witnesses.

From the consideration of the evidence, the Committee regards the following facts as clearly established:—

1. The aircraft was built by Messrs. Farman in Paris, and was delivered new to the Central Flying School in July, 1913.

2. The wind at the time of the accident was 10 to 15 m.p.h., and somewhat gusty.

3. The pilot had previous experience on other types of aircraft and had flown the Maurice Farman Biplane several times, including one flight the same morning.

4. This particular aircraft had been flown previously the same morning by another officer and had been found to be in perfect order.

5. The aircraft was fitted with an engine revolution indicator and air speed indicator.

6. The controls were found to be in working order after the accident.

Opinion.—The Committee is of opinion that the accident was due to the aircraft having lost flying speed owing to an error on the part of the pilot.

FROM THE BRITISH FLYING GROUNDS.

Royal Aero Club Eastchurch Flying Grounds.

Naval Flying.—Monday, a fine day for flying. No. 43 Bristol tractor, 49 and 50 B.E.'s and 104 Sopwith to Isle of Grain returning as escort to Mr. Winston Churchill. 24 Bristol, 150 Avro, 16 Avro, 153 Bristol tractor, 31 Henry Farman were also up.

Tuesday, fine. No. 2 Short instruction, 150 Avro, 16 Avro, Lieut. Marx cross-country, 10 Short, 70 Maurice Farman, 49 B.E., 43 Bristol tractor, 153 Bristol tractor.

Wednesday, fine. No. 2 and 64 Shorts, 7 Deperdussin, 70 Maurice Farman, 150 Avro, 50 B.E., 31 Henry Farman.

Thursday, fine. Very little flying was done on account of the heat; the following only were up:—No. 2 and 10 Shorts, 70 Maurice Farman.

Friday, fine. Again very hot. Nos. 2 and 64 Short, 150 Avro, 70 Maurice Farman cross country, "P. O. Hooper and passenger."

Saturday, windy and rain. No. 2 Short, instruction 70 Maurice Farman, P. O. Hooper to Chatham.

Sunday, very windy towards midday. Com. Samson left about 10 a.m. on Maurice Farman No. 70 for Isle of Grain, on arrival he transferred to a waterplane, and left to try to get tidings of Mr. Hamel, but had to return to Grain owing to the stormy wind.

Civilian Flying.—Monday morning, Mr. Hamel, from Isle of Grain, in company with Mr. Winston Churchill and naval machines (escort). Shortly after arrival he looped the loop about six times on his Morane monoplane, 80 h.p. Gnome, afterwards leaving in the direction of Grain for Hendon.

Monday evening, the Hon. M. Egerton made a fine flight of about an hour on his 50 h.p. Short.

Tuesday, Wednesday and Thursday evenings, the Hon. M. Egerton was flying for about an hour.

Friday, Mr. Alec Ogilvie flew to Hastings and back on his 50 h.p. Wright.

Saturday and Sunday no flying.

Brooklands Aerodrome.

On Monday morning last week, the Bristol and Vickers pupils were out. In the afternoon, Mr. Barnwell on the Vickers biplane, Mr. Busted on the Bristol "scout," Mr. Mahl on the 80 Sopwith two-seater. Vickers and Bristol pupils at work. Mr. Roland Ding arrived with passenger from Hendon on a Handley Page machine, and returned to Hendon. Wind variation 0-20 m.p.h.

Major Phillips, D.S.O., passed his *brevet* tests (altitude 400 ft.), on Tuesday morning, in good style on a Vickers biplane. Vickers and Bristol Schools busy. Lieut. Collet came in on D.F.W. biplane (154). Vickers "scout" arrived. In the afternoon, Mr. Mahl made several flights with and without passengers on the 80 Sopwith. School work by Bristol and Vickers pupils.

Blériot pupils out on Blériot "penguin," and Mr. Waterfall on the Martinsyde monoplane. Wind variation 0-24 m.p.h.

On Wednesday morning Blériot, Bristol, and Vickers pupils busy. Mr. Waterfall out on Martinsyde monoplane with Miss Cyril Orr Paterson as a passenger. Arrival of No. 5 Sopwith "scout." Mr. Mahl on Sopwith 80. In the afternoon, Mr. Merriam giving exhibition flights on Bristol biplane for cinematograph. Arrival of Sopwith Schneider Cup machine. Mr. Barnwell testing 100 h.p.



Mr. Geoffrey Charles Gold, who has taken his ticket recently at the Blériot School.

gun 'bus, and afterwards with passenger. Mr. Mahl with two passengers on Sopwith 80. Vickers, Blériot, and Bristol school work. Excellent *brevet* tests were passed by Mr. Norman Wood Smith, Vickers biplane (altitude 1,250 ft.), and Mr. J. B. T. Leighton, Vickers biplane (altitude 2,800 ft.). Messrs. H. Racine Jacques and G. Desmond Mills passed the first portion of their *brevet* tests on Bristol biplanes. Major Raleigh, of No. 4 Squadron, R.F.C., with Lieut. Mitchell as passenger, came in from Netheravon on B.E. 299. Wind variation, 0-14 m.p.h.

Bristol and Vickers schools at work, Thursday morning, Mr. Alcock for an hour's flight on the Sunbeam-engined Maurice Farman. Mr. Mahl with passenger on the Sopwith 80. In the afternoon, Lieut. Collet on the D.F.W., Mr. Pixton on Sopwith Schneider Cup machine, Mr. Jullerot solo on Bristol biplane, Mr. Merriam solo on Bristol biplane, and Blériot, Vickers and Bristol school work. Wind variation, 0-18 m.p.h.

Friday morning, Bristol, Blériot and Vickers pupils out. Mr. Dukinfield Jones for several flights up to 2,000 ft. on the D.F.W. biplane, the engine of which he has succeeded in tuning up to produce another 100 revs. Mr. Barnwell testing Vickers "scout." Lieut. P. B. Joubert de la Ferte in from Netheravon on Blériot. In the afternoon, Mr. Pixton for several flights on the 100 Sopwith, Mr. Knight on the 70 Vickers, Mr. Mahl for several flights on the 80 Sopwith, Mr. Waterfall on the Martinsyde, Mr. Alcock on the Maurice Farman, and a pilot "taxying" on a Perry Beadle biplane. Bristol, Vickers and Blériot pupils out. *Brevet* tests on Bristol biplanes by Lieut. Mills, H. Racine Jacques, Robert Lagrange (altitude 700). Wind, 0-14.

Blériot, Vickers, and Bristol pupils out on Saturday morning. Mr. Sippe on Bristol "scout" (Clerget engine), Mr. Pixton on Sopwith "scout," Mr. Barnwell on Vickers Blériot, Mr. Elsdon on Vickers Blériot, Mr. Alcock for an hour's flight on 100 Sunbeam, Lieut. P. B. Joubert de la Ferte testing two-seater Blériot, Mr. Waterfall on Martinsyde, Mr. Pixton left for Hendon at 10.30 a.m. on Sopwith Schneider Cup machine, and in the afternoon Mr. Sippe on Bristol "scout" and Mr. Alcock on 100 Sunbeam.

On Sunday, in dull weather and a fresh wind, Mr. Mahl made a number of flights with and without passengers, as also Mr. Waterfall on the Martinsyde (on which machine the winner of the ballot for the free passenger flight, Mr. A. C. V. Prior, of King's Bench Walk, Temple, had a trip across country), and Mr. Pixton on the Sopwith "scout."

Next Sunday afternoon, at 3.30 p.m., an interesting altitude handicap will be started, in which there will be competing three up-to-date biplanes of the "scout" type, namely Sopwith (Pixton), Vickers (Barnwell), and Bristol (Sippe), the 100 h.p. Vickers gun 'bus (Knight), the 120 h.p. Martinsyde monoplane (Waterfall), the 100 h.p. Sunbeam-engined Maurice Farman (Alcock), the 80 h.p. two-seater Sopwith biplane (Mahl).

On Whit-Monday there will be ten starters in the Cross-country Aeroplane Handicap, and a great struggle is expected between the pilots of the Bristol, Sopwith and Vickers biplanes of the "scout" type. Amongst the other starters will be Waterfall (Martinsyde), Alcock (100 Sunbeam), Knight (100 gun-'bus), Mahl (Sopwith two-seater), and Elsdon (70 Vickers).

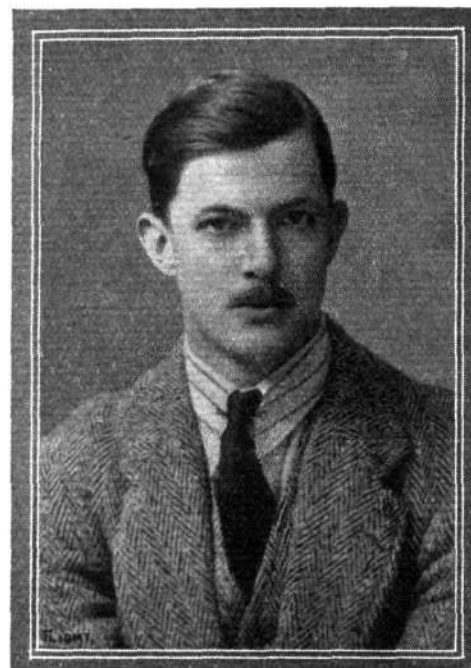
Bristol School.—Full advantage was taken of the splendid weather during last week, over 220 flights being made at this school. Mr. Lagrange and Lieut. Mills both obtained their certificates on Friday evening, flying splendidly throughout, and Mr. Racine Jacques completed two-thirds of the tests for his *brevet*.

On Monday, pupils taken as passengers: Mr. Parker, Lieut. Richard (8), Mr. Chambers (12), Mr. Eastwood (5), Mr. Gresley (3).

Pupils having control with pilots as passengers: Mr. Lagrange, Mr. Jacques, Mr. Chambers (2), Mr. Gresley (2). Solos by: Lieut. Mills (9), Mr. Lagrange (5), Capt. Walcot (5), Mr. Jacques (2), and Mr. Parker (5).

Tuesday, Jullerot and Stutt with Mr. Gresley (5), Mr. Eastwood (4), Lieut. Richard, and Mr. Chambers as passengers. Pupils controlling—Mr. Chambers, Lieut. Richard, Mr. Eastwood (2), Mr. Gresley and Mr. Lucas. Solos:—Capt. Walcot (6), Lieut. Mills (8), Mr. Parker (8), Mr. Lagrange (7), and Mr. Jacques.

Passenger tuition, Wednesday, to:—Mr. Lucas (4), Mr. East-



Mr. J. A. Liddell, who last week obtained his *brevet* on a Vickers biplane at the Vickers Flying School, Brooklands.

wood, Mr. Chambers (7), Mr. Gresley (3), Lieut. Richard (5). Solo flights by Lieut. Mills (3), Mr. Parker (3), Mr. Eastwood (3), Mr. Lagrange (3), Mr. Gresley and Mr. Lucas.

Thursday, Jullerot, Merriam, and Stutt, taking as passengers: Mr. Gresley (2), Mr. Chambers (3), Capt. Walcot, Lieut. Richard (4); afterwards sitting behind Mr. Chambers (5), Lieut. Richards (2), and Mr. Gresley (2). Solo flights by Lieut. Mills, Mr. Jacques, Mr. Eastwood (2), Mr. Lagrange, and Capt. Walcot.

Passenger tuition, Friday, to Mr. Chambers (3), Lieut. Richard (4), Mr. Eastwood, Mr. Gresley (2). Solo flights were made by Mr. Parker (2), Mr. Eastwood (4), Lieut. Mills (2), and Mr. Lagrange.

Saturday, solos by Capt. Walcot, Mr. Parker (2), Mr. Gresley (2), and Mr. Eastwood.

Vickers School.—Instructors for last week, Barnwell, Elsdon, Knight, Webb. Monday, with pilot, Major Phillips and Messrs. Parker, Wilson, Lieut. Wood-Smith and Major Phillips solos. Lieuts. Eberli and Tennant and Mr. Steinbach with pilot.

Tuesday, with pilot, Lieuts. Eberli and Tennant and Messrs. Parker, Collins, Wilson and Steinbach. Lieuts. Wood-Smith, Tennant, and Messrs. Collins and Wilson solos. Major Phillips for *brevet* in excellent style.

Wednesday, Lieut. Leighton solo. Lieuts. Wood-Smith and Leighton for *brevets*, both in splendid style. Lieut. Tennant with pilot.

Thursday, Lieut. Eberli with pilot. Messrs. Wilson, Collins and Steinbach solos. Lieut. Gillman and Mr. Parker with pilot.

Friday, Mr. Wilson and Lieut. Eberli with pilot. Messrs. Parker, Collins and Wilson solos. London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—Monday, last week, Messrs. Robinson, Shepherd, Weber, Wyles, Boyesen, Carpenter, Howitt, Liu and Lowe, straights with Instructors Howarth, Lillywhite and Barrs. Major Piercy solo straights, circuits, &c., afterwards going in for and passing



Lieut. Collet, of the Naval Wing of the R.F.C., in the pilot's seat of the 100 h.p. D.F.W. Arrow biplane, prior to his testing the machine on a long flight at Brooklands.

brevet tests. Cowley solo straights, Mr. Moore, figures of eight, &c., afterwards passing first and second part of *brevet* tests.

Tuesday, Messrs. Peck, Robinson, Shepherd, Palmer, straights with Instructor Howarth. Messrs. Carpenter, Lowe and Liu, straights with Instructor Birchenough. Messrs. Boyesen, Winter and Weber straights with Instructor Lillywhite. Mr. Howitt straights with Instructor Barrs. Mr. Moore going in for third part of *brevet* tests and gaining certificate.

Wednesday, Messrs. Wyles, Peck, Robinson, Shepherd, Weber, Winter, Boyesen, Carpenter, Cowley, Howitt, Liu, Palmer and Lowe straights with Instructors Howarth, Lillywhite and Barrs. Mr. Carpenter solo circuits. Mr. Howitt solo straights.

Thursday, Mr. Howitt solo straights and circuits. Messrs. Winter and Weber solo straights. Messrs. Boyesen, Liu, Peck, Tapps, Wyles, and Lowe straights with Instructors Lillywhite, Howarth and Barrs in passenger seat.

Friday, Messrs. Robinson, Shepherd, Tapps, Wyles, and Peck straights with Instructor Howarth. Messrs. Weber and Winter solo straights. Messrs. Lowe, Liu, Gruning, and Palmer straights with Instructor Barrs. Mr. Howitt solo circuits. Mr. Boyesen straights with Instructor Birchenough.

Saturday, Messrs. Peck, Robinson, Shepherd, Boyesen, and Liu straights with Instructor Howarth in passenger seat. Mr. Weber solo straights.

British Caudron School.—Monday, last week, the Caudron school was out at 5 a.m., under the instruction of W. T. Warren and R. Desoutter. Mrs. Buller doing straights. Rene Desoutter flight.

Tuesday, school at 5 a.m., under the instruction of W. T. Warren

and R. Desoutter. W. T. Warren trial flight. Mrs. Buller doing straights with good landings. Mr. Macgregor doing straights and circuits in good style. Rene Desoutter flight.

At 5 a.m. Wednesday, school out under the instruction of W. T. Warren and R. Desoutter. Mrs. Buller doing straights and first circuits in good style. Mr. Macgregor doing circuits. W. T. Warren and R. Desoutter flight.

Thursday, school out at 5 a.m. under the instruction of W. T. Warren and R. Desoutter. W. T. Warren test flight. Mrs. Buller doing circuits. Mr. Macgregor doing circuits in good style. Rene Desoutter flight. Friday and Saturday windy.

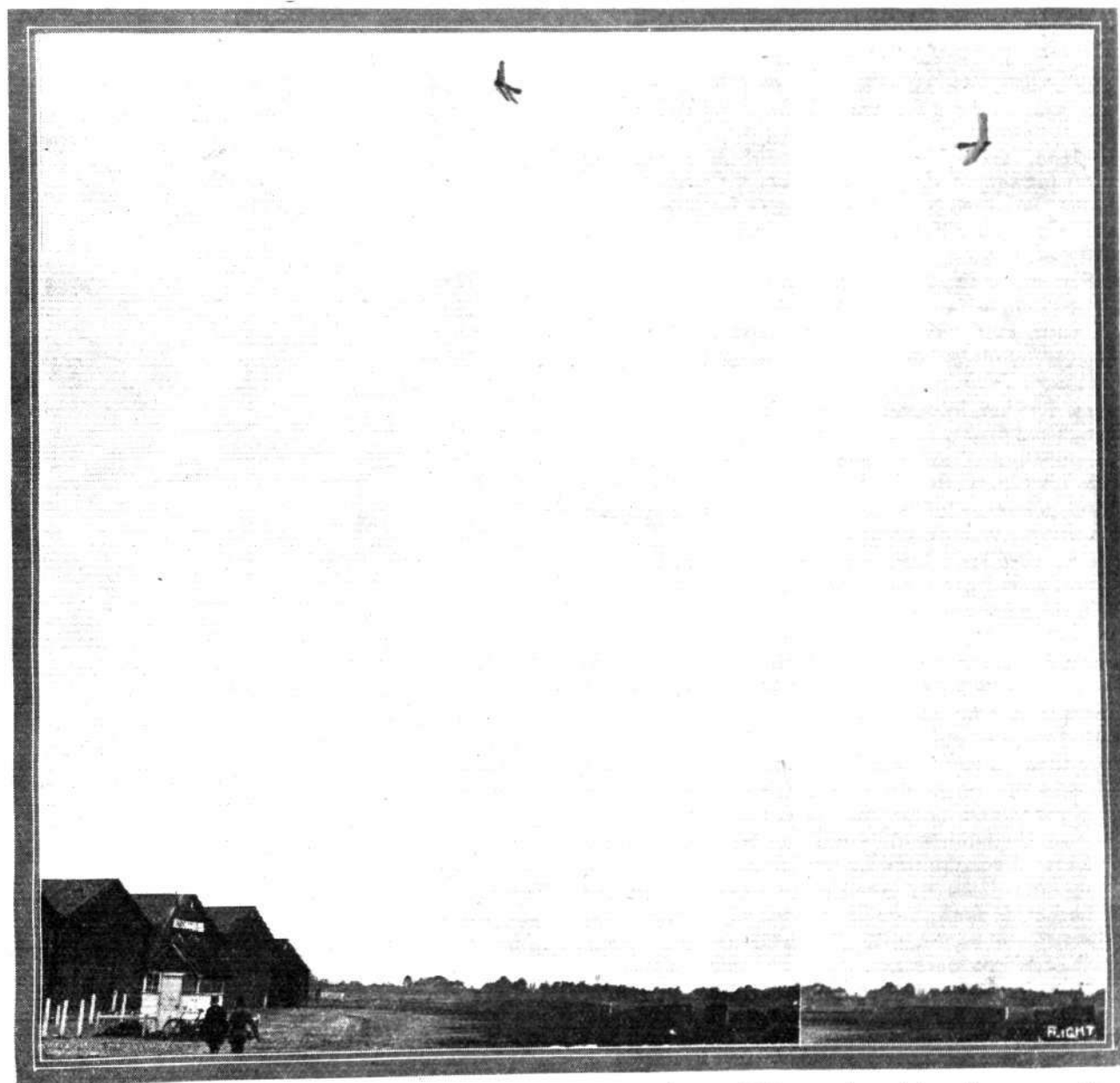
Hall School.—Monday, last week, Miss Sophie d'Elsa and A. Charig straights on Penguin.

Tuesday, Miss Sophie d'Elsa, A. Charig, and Haines straights on Penguin. Rose taxying machine, tried to damage some palings.

Wednesday, J. Clappen instructing. Messrs. A. L. Brookes, A. F. Arcier, and H. Gearing eighteen straights each on No. 1 Caudron 10 to 50 ft. high; landings much improved. In afternoon, A. Charig on 25 Anzani-Penguin. In evening, A. F. Arcier after two good straights made two pretty circuits at 200 ft., landing gracefully. A. L. Brookes and H. Gearing four straights each.

Thursday, 5 p.m., J. Clappen and Virgilio instructing. A. F. Arcier one good straight and perfect landing, but had to give up owing to engine trouble.

During the week, every morning H. C. G. Allen has been making steady progress on his 35 h.p. Anzani-Blériot with neat landings. Mr. Clappen was out testing the school Deperdussin but a cyclinder blew off and alighted on one of the wings.

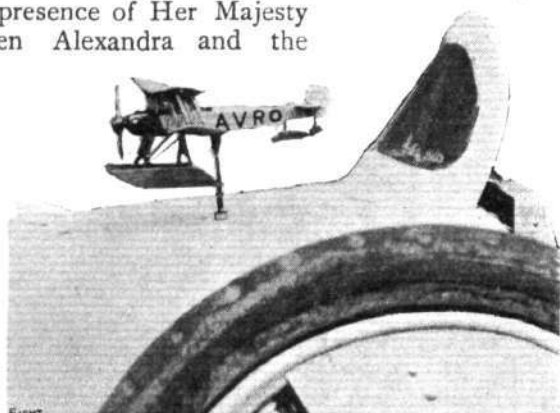


Some fine specimens of banking on the 100 h.p. D.F.W. all-steel Arrow biplane, when being flown recently by Lieut. C. H. Collet, of the Naval Wing of the R.F.C. at Brooklands.

EDDIES.

It was a great pity that the weather should have got a fit of sulkiness on Saturday last and thereby prevent the flying of the Aerial Derby round London, but in this case as in so many others the truth of the old proverb: It is an ill wind, &c., holds good, for the postponement of the race may enable some of the entrants who had scratched on account of not being able to get their machines finished in time, to be ready for the race on June 6th.

Congratulations to Frank Goodden for the masterful loops which he executed at Hendon on Saturday last, in the presence of Her Majesty Queen Alexandra and the



An Avro mascot on a car at Hendon on Aerial Derby Day.

Dowager Empress of Russia. In spite of the strong wind which was blowing at the time, the loops were some of the cleanest it has ever been my good fortune to see. The little Caudron showed no uncertainty as to whether it should pass the top of the curve or do a tail slide, or simply flap out of the top of the circle, it calmly completed the circle without any undue deceleration on the upward path, and with no feverish haste to reach its normal position on the downward portion of the curve.

Sydney Pickles, in accordance with his intention to continue his flying more as an amateur, is sending his Blériot monoplane up to Leeds where he proposes to establish his headquarters. I should very much like to see other sportsmen follow his example, for aviation as a sport can now, I think, compare not unfavourably with other branches of sport both as regards safety and expense, and certainly as regards the amount of enjoyment to be got out of flying a machine for the sport of the thing.

It was a revelation to me on a recent visit to Cowes to see the way in which Mr. Gordon England handled the Wight seaplane, both on the water and in the air. He repeatedly made complete circles on the sea of certainly not more than 30 feet in diameter and took the machine off with less fuss than many a car driver exhibits when changing gears and letting in his clutch. Of course, Mr. Gordon England, with typical modesty, disclaimed any credit for the extraordinary performances of the 'bus, which he puts down to excellence of design. At the same time Mr. Howard Wright, its designer, I think has been fortunate in securing Mr. England to demonstrate the excellent Wight machines.

The method employed in getting the Wight seaplane out of and into the harbour is one of the neatest I have seen. The very strong tide makes it somewhat risky to navigate the machine under her own power among the

numerous craft anchored or passing, and so as an extra precaution she is towed or rather guided behind a motor boat into open water. A rope is taken from the lower end of each front float strut to the motor boat and the engine of the machine is kept running just sufficiently fast to give the machine the same speed as that of the boat, and in this manner the great seaplane is manoeuvred with surprising ease in and out of the harbour. On reaching open water the tow ropes are cast off, Mr. England opens out the throttle and in less time than it takes to describe it the machine is off. Once in the air there is very little to do, for she is so perfectly balanced that she practically takes care of herself. Mr. England nonchalantly leans back in his seat resting his elbows on the gunwales of the nacelle while he has a look at the exceptionally fine view spread out below him. Practically all he has to do is to steer in the direction in which he wishes to go. The speed is regulated as in a motor car by closing or opening the throttle without any attention to the elevator whatever. Whether going at 35 or at 79 m.p.h. the Wight remains on an even keel without any necessity for keeping her nose down when going all out and without flying cabre when doing her lowest speed.

Mr. Pemberton Billing, whom I hurriedly interviewed at Hendon on Saturday last, informs me that "Supermarine P.B.1" will be tested to-day (Friday) over Southampton Water. Our readers no doubt remember



Aerial Derby Day at Hendon.—Making the best of being unable to get a front seat.

P.B.1, which was exhibited at last Olympia Aero Show. At that time it had the engine placed in a casing above the boat and in front of the main planes. This arrangement, I learn, has been altered, and the engine is now arranged inside the boat, just behind the pilot's seat, and drives, by means of chains, the two propellers which are placed behind the main planes.

Mr. Pemberton Billing hopes to obtain with P.B.1 some very valuable data for a newer type he has designed, and which is, he assures me, absolutely *le dernier cri* in seaplane construction. At present he does not wish any of the details to be made public, but I will take the chance of incurring his wrath by whispering that the boat, engine and propeller, and pilot's seat form a unit which can be instantaneously detached from the main planes, and used as a high speed motor boat.

Mr. E. R. Whitehouse, who has lately been flying the Curtiss flying boat, informs me that Messrs. White and Thompson of Middleton, Bognor, are now busily engaged on the construction of a new flying boat for this year's *Daily Mail* waterplane flight round Britain. This machine, I understand, will be fitted with two Curtiss engines (British built, of course), each of which will drive a separate propeller. In other respects the new machine will follow fairly closely standard Curtiss practice.

x x x

It appears that Mr. Fowler's establishment at Eastbourne is in a fair way to become "the road to success," for not long ago one of Mr. Fowler's pupils, Mr. Thornely, secured an engagement to give exhibition flights in Germany, and now I learn that Mr. E. L. Gassler, who has been acting as designer and pilot for the Eastbourne Aviation Co., is leaving shortly, and that we may expect to hear of him in connection with a large, well-known English firm. Good luck to him!

x x x

No doubt there are some of our readers who remember the time—long before the days of aeroplanes—when Capt. Thomas S. Baldwin made those exciting parachute descents at the Alexandra Palace. I cannot say off-hand how long ago it was, somewhere about the early 'eighties I think, but anyway, Hendon received a visit from the self-same Baldwin—who is, by the way, the designer of the Baldwin "Red Devil" biplanes and other machines that have been flying with success in America—on Thursday and Saturday of last week, where he saw an aerial show vastly different from the one he himself took

Professor Baldwin in the sun.



part in afar back. As he said, "Gee, but things have changed some." Yes, and they have changed in the parachute line as well, according to his account of the shows they give "over there" now. What they do is this: The parachutist ascends in a hot air balloon with eight parachutes packed one on the top of the other, and as the descent is made these are cut free one after the other until he is ultimately supported by the last of the series. It is intended to increase the number of parachutes to ten in future displays. I should have thought the risk of one parachute not opening was bad enough, but ten! Well, I should call it "some nightmare."

x x x

I understand that Capt. Baldwin is not over here entirely on pleasure bent, but has some business in hand in connection with an aviation concern that is to be started on a large scale in America under the name of the Connecticut Aviation Co. The trouble with the Wright patents will not affect this concern, as Baldwin informs me that he holds the Wright license and intends to "sub-let." Beyond this I could

not get any further information, so we must "wait and see." I hope Capt. Baldwin was impressed with our attempts at aviation over here, and that he will not take too many of our pilots away with him, for he says he has his eye on several of our crack flyers and hopes to send them across the Atlantic to be made a fuss of.

"ÆOLUS."

✱ ✱ ✱ GUSTAV HAMEL.

It is with profound regret that we have been forced to the conclusion, as we state elsewhere, that Mr. Gustav Hamel came to an untimely end during his Channel trip which he started on Saturday morning last. Briefly the record of his movements shows that Hamel left Villacoublay at 4.40 a.m. on the new Morane monoplane with 80 h.p. Gnome monosoupape engine with which he proposed to compete in the Aerial Derby last Saturday afternoon. At 5.22 he reached Le Crotoy, and having breakfasted, he left at 8.30 for Hardelot, where he landed half an hour later. There he rested for a couple of hours, then had a light lunch, filled up the fuel and oil tanks of his machine, and left Hardelot at a quarter past 12. From that time nothing is known of the airman's movements, although the Cross-Channel steamer "Riviera" reported seeing an aeroplane flying in mid-Channel on Saturday afternoon.

Hamel was one who had done very much for the cause of aviation in this country. The son of a well-known English surgeon and a clever motor driver, it was not surprising that aviation should attract him. Having studied the question in France, he set to work and qualified for a French certificate on a Morane monoplane on February 3rd, 1911. Returning to England he repeated the necessary tests on a Blériot monoplane, and obtained a British certificate on February 14th, 1911. He quickly showed that he was master of the Blériot type of machine, and he was selected to pilot a Blériot racing monoplane in the Gordon-Bennet race at Eastchurch, in July, 1911. It will be recalled that on

the morning of the event, a trial flight showed that the machine was slightly slower than some of his rivals' mounts. With the object of augmenting the speed, M. Blériot decided to shorten the already very small wings, but, in the race, when rounding the first pylon, Hamel's machine side-slipped to the ground, no doubt owing to his taking too sharp a turn. The pilot was fortunately thrown clear and escaped with very severe concussion.

In July he took part in the Circuit of Britain, and after a good deal of engine trouble he was forced to retire at Dumfries. In the following September he took the principal part in the aerial post between Hendon and Windsor, flying in spite of the high winds. In the Aerial Derby of 1912 he secured the second place, last year seeing him a very popular winner of the event, whilst he was the favourite for the race which was to have been held last Saturday, the day of his disappearance. Of his many Cross-Channel trips, one of the most outstanding was that made in the course of his flight from Dover to Cologne on the Blériot machine which was subsequently presented to the New Zealand Government.

In a match against Hucks over a course round Birmingham last August, Hamel secured a victory by a narrow margin. He won several races at Hendon, and his flying there and at Brooklands was always highly popular, especially since last November, when he added looping the loop on the Morane to his accomplishments, and he had the honour of twice being commanded to "loop" before the King at Windsor.

CROSS-CHANNEL ON THE HANDLEY PAGE BIPLANE.

THE merits of the Handley Page biplane, with 100 h.p. Anzani motor, were strikingly brought out in the flight which was made on Thursday last by Mr. W. Rowland Ding, with Princess Ludwig of Lowenstein-Wertheim, from Hendon to Calais. He left Hendon Aerodrome at 7.40 a.m., and reached Eastbourne at 8.45 a.m. After waiting for the fog to clear in the Channel, he left Eastbourne at 3.30 p.m., and flying to Dover flew across the Channel in the

down. However, the engine picked up all right and flew safely through to Staplehurst. Here he had breakfast and filled up the aeroplane's tanks with petrol. He arrived safely at Hendon at 11.30 a.m.

It will be recalled that Mr. Ding only obtained his pilot's certificate on April 28th, and these were his first long cross-country flights.



Mr. Rowland Ding in the Handley Page biplane, with Princess Ludwig of Lowenstein-Wertheim in front, just before their departure from Hendon to fly across the Channel, en route for Paris.

record time of 15 mins., and landed at Calais at 4.20 p.m. There the Princess joined the train and went on to Paris. The next day Mr. Ding left Calais at 8 a.m. and flew across to Staplehurst, in Kent, after having a rather nasty moment in the channel, as for a few moments the engine hesitated and the machine began to glide

On Tuesday, Mr. Ding set off from Hendon for Bath about 5 a.m., but owing to his compass going wrong he found himself over Southampton Water. Turning to the north-west he got to Salisbury Plain, where he made a landing. Later he flew over to Bath in 22 mins.



ROYAL FLYING CORPS (MILITARY WING).

WAR OFFICE summary of work for week ending May 23rd, 1914 :—

No. 2 Squadron.—This Squadron remained at York till Friday, 22nd, on which day it moved to Lincoln, where all the machines, mechanical transport and personnel arrived by the scheduled time. The Squadron has been delayed at Lincoln to-day owing to continuous heavy rain. It will move to Northampton on Monday, and thence to Netheravon via Oxford.

All ranks are gaining very valuable experience from this progress by stages under service conditions, from Montrose to Salisbury Plain.

No. 3 Squadron.—Over 2,000 miles were covered during the week in reconnaissance flights. Observation and direction or artillery fire was successfully carried out.

No. 4 Squadron.—The pilots of all three "Flights" were out daily engaged in reconnaissance work over Salisbury Plain and the surrounding district.

No. 5 Squadron.—Several long cross-country reconnaissances were made, including flights to and from Bath and Brighton.

No. 6 Squadron.—All the pilots of this Squadron were out every day on B.E., R.E. and M. Farman machines practising reconnaissance work.

Nos. 1 and 7 Squadrons.—Steady progress was made with the foundation of these new Squadrons at Farnborough. A certain amount of flying was carried out, and also instructional work on aircraft and engines.

Headquarter Flight.—Experimental work with aeroplanes and kites was continued.

Aircraft Park.—The Flying Depot will in future be known as the Aircraft Park. This unit has been occupied with repair work to aircraft and M.T., with special courses of instruction, and with the technical training of recruits.

General News.—1. On Tuesday, the 19th inst., Their Majesties the King and Queen, accompanied by Princess Mary, the Chief of the Imperial General Staff, Sir Douglas Haig, General Officer Commanding-in-Chief Aldershot Command, and their suite, visited the Royal Flying Corps (Military Wing). His Majesty inspected the recruits, the workshops, and M.T. sheds and the aircraft. 25 machines were paraded for inspection; they ascended in turn

from Jersey Brow and landed on Farnborough Common, after making a circuit of the aerodrome.

Photographs of the inspection were taken from a Henry Farman at 2,000 ft., and the prints were handed to Their Majesties at the conclusion of the inspection. His Majesty was in wireless communication with a B.E. At the conclusion of their visit to the Military Wing, Their Majesties visited the Naval Airship Detachment, and later the Royal Aircraft Factory.

2. The funeral of the late Lieut. J. Empson took place at Blacktoft Church, Yorkshire, on Wednesday last, and that of Air-Mechanic R. G. Cudmore at Manchester on the following day. Strong detachments from No. 2 Squadron attended both funerals. Lieut.-Colonel F. H. Sykes, Commanding the Royal Flying Corps, Military Wing, and representatives from the War Office and other squadrons of the Military Wing were also present.

Col. Seely's Flights.

REPLYING to a question put in the House of Commons by the Marquis of Tullibardine, as to whether Col. Seely recently took charge of an Army aeroplane, on which he was passenger, when in the air, and for which he claimed automatic stability, or whether the pilot still exercised foot control.

Mr. H. Baker, of the War Office, said that the reply to the first part of the question was in the affirmative, and to the second in the negative.

The Aerial Picnic.

In spite of the wretched weather the picnic arranged by the Association Amicale des Aviateurs for Sunday last was a great success, thirteen machines being flown over to the rendezvous, Chartres. Those taking part were Fourny (M. Farman) with Derome as passenger from Etampes, Leblanc (Blériot) with A. Guymon, Giraud (Blériot) with Max Bruyere, Comte de Larenty Tholozan (Blériot), Senator Raymond (Blériot), M. Farman (M. Farman) with Barbaroux, Bille (H. Farman), Auger (M. Farman) with Senouques, Molla (R.E.P.), Marquis de Larenty Tholozan (M. Farman), all from Buc, Mahieu (Voisin) with two passengers from Chateaufort, Bonnier (Nieuport) with Mme. Bonnier from Villacoublay, and Lenoir (Blériot) from Juvisy. After the picnic several of those taking part indulged in some fancy flying before one and all returned to their starting points.

THE FLYING MACHINE FROM AN ENGINEERING STANDPOINT.

By FREDERICK WILLIAM LANCHESTER, M.Inst.C.E.

(Continued from page 556.)

In the first place, each aspect ratio should be explored by a number of determinations using aerofoils of varying camber; secondly, the aerofoil section must not be uniform from end to end, the section must be "graded," or, as it is sometimes expressed, the camber must "wash out" at the extremities. Beyond this, not one series must be tried but some dozen or more. The final "winner" for each aspect ratio is the aerofoil of greatest lift/drift.

In my opinion, in the present unsatisfactory state of things, it is best (so far as the pressure constant is concerned) to assume a uniform value for all values of aspect ratio, say that given as appropriate to aspect ratio = 6 in the Table IV. Whether we consider the N.P.L. result as valid or not, the salient fact is that we have at present no sufficient evidence that there is any change in the pressure constant worth taking into account. Alternatively we are not going far astray if we assume aerofoil pressures equal to half the pressure on the normal plane, as shown in Fig. 18.

The most important fact with which we are immediately concerned in connection with the theory of least resistance is that the total aerofoil resistance for least value is almost constant in respect of velocity; in other words, provided that we design for least resistance, we know our traction coefficient in advance; it is virtually a constant, just as though the problem were that of an automobile required to ascend a hill of known gradient—an analogy which comprehends the fact that there is the direct wind resistance or body resistance additional in both cases. This constant is only within control, inasmuch as by careful design the effective value of the coefficient of skin friction, ξ , can be kept down, and a high aspect ratio adopted. Theoretical values of least gliding angle (that is to say, resistance coefficient), tabulated for values of ξ and aspect ratio, are given in Table V. (From *Aerial Flight*, vol. 1, p. 262.) It is of some interest to enquire to what extent these results are in agreement with modern experiment.

TABLE V.—Least Gliding Angle ($=\gamma_1$) (Theoretical).

n.	$\xi=0.025$	$\xi=0.02$	$\xi=0.015$	$\xi=0.010$
3	6°25' 1:9.2	5°6' 1:10.2	4°8' 1:12	3°95' 1:14.5
4	5°75' 1:10	5°15' 1:11.1	4°4' 1:13	3°65' 1:15.7
5	5°3' 1:10.8	4°75' 1:12	4°1' 1:14	3°4' 1:16.8
6	5°0' 1:11.5	4°5' 1:12.8	3°9' 1:14.7	3°2' 1:17.9
7	4°7' 1:12.2	4°25' 1:13.5	3°6' 1:15.9	3°0' 1:19.1
8	4°5' 1:12.8	4°0' 1:14.4	3°4' 1:16.8	2°8' 1:20.5
...
10	4°1' 1:14	3°65' 1:15.8	3°2' 1:17.9	2°6' 1:22
...
12	3°8' 1:15	3°42' 1:16.8	3°0' 1:19	2°4' 1:23.9

I have collected experimental data from various sources; a series of aerofoils of Blériot section—(Report of the Advisory Committee, 1911-12, p. 75),—aspect ratios vary from 3 to 8. Determinations of Voisin wing by Mr. Eiffel, aspect ratio 6.3. Aerofoil "R.A.F. 6," aspect ratio 6. Aerofoils from my 1894 model, aspect ratio 13.3, Fig. 16, independent determinations by N.P.L. and Göttingen Laboratories. The above are given in Table VI; columns 1, 2, and 3 give the aspect ratio, type and authority respectively; column 4 gives the experimental determination, and my theoretical values are given in columns 5 and 6 for values of $\xi=0.02$ and $\xi=0.015$. Table VI is shown plotted in Fig. 19, the relation of aspect ratio to lift/drift being represented by curves drawn through the observed and calculated values.

TABLE VI.

1. Aspect Ratio.	2. Type.	3. Determination by	4. Experimental.	5. Calculated $\xi=0.02$.	6. Calculated $\xi=0.015$.
3.0	Blériot section	N.P.L. ...	10.1	10.2	12.0
4.0	"	" ...	11.5	11.1	13.0
5.0	"	" ...	12.9	12.0	14.0
6.0	"	" ...	14.0	12.8	14.8
6.0	R.A.F. 6	" ...	14.5	—	—
6.3	Voisin...	Eiffel ...	14.0	—	—
7.0	Blériot section	N.P.L. ...	15.1	13.5	15.9
8.0	"	" ...	15.5	14.4	16.8
10.0	—	—	—	15.8	17.9
12.0	—	—	—	16.8	19.0
13.3	Author, 1894	N.P.L. *	17.1	—	—
		" *	17.6	—	—
		" †	20.0	—	—
		Göttingen†	16.4	—	—
		" †	17.3	—	—

* Velocity 30 ft. per sec.

† Value at 50 ft. per sec. (computed by N.P.L.).

‡ Velocity not stated.

It will be noted on referring to Table VI and Fig. 19 that the agreement is almost complete. The two cases of the Eiffel determination of the Voisin aerofoil and the R.A.F. 6 aerofoil are shown as outlying points, not being fully in agreement with the main run of the remaining experimental determinations; it will be noted, however, that the whole of the experimental values lie between the two adjacent theoretical curves given, and the general form of the experimental curve corresponds to the curves given by my equations. It is true that there is something in the nature of the hump on the experimental curve, the extremities of which correspond to a double surface coefficient of skin friction of 0.02, whereas the central part of the curve round about aspect ratio = 6 rises nearly to the upper curve. This peculiarity of angular character of the curve may be a real feature, but I am disposed to think that is more probably due to the fact that a great deal more experimental work has been done in the region of the hump of the curve and so more highly perfected forms have been available than for aspect ratios of greater or less value. It would appear probable that if equal diligence were displayed in designing and testing forms of other aspect ratios the upper theoretical curve ($\xi=0.015$) would be found to be very close to the

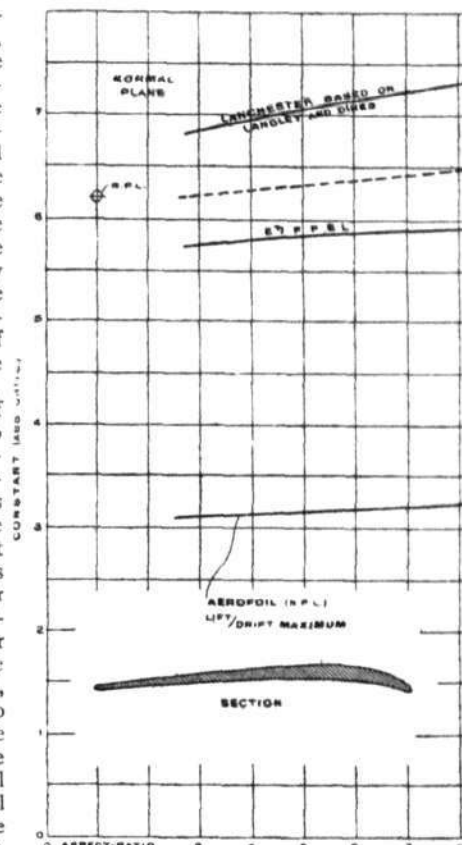


Fig. 18.

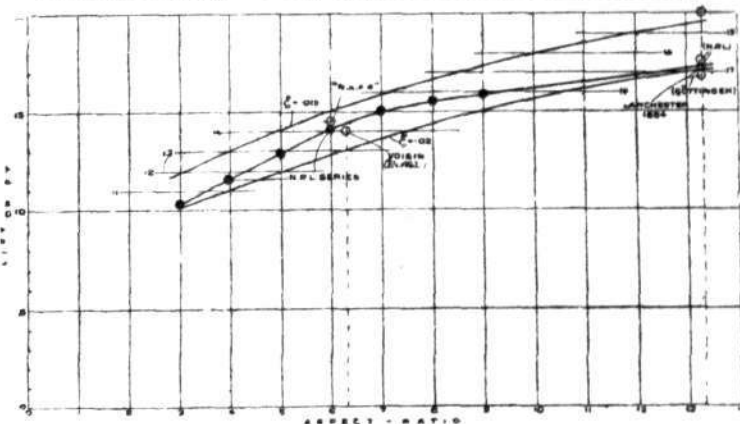


Fig. 19.

truth; some confirmation of this is found in the fact that the best value for the R.A.F. 6 aerofoil, a form that had been subject to considerable study both by the R.A.F. and the N.P.L., lies considerably above the curve representing the run of other observations.

In the N.P.L. report to me on the tests of my 1894 model, it is stated that if it had been found possible to employ a velocity of 50 feet-per-second instead of 30 feet-per-second, the figure obtained would probably have reached the neighbourhood of 20. This value is also plotted as an outstanding point in Fig. 19.

(To be continued.)

THE DEVELOPMENT OF THE AEROPLANE.*

By DR. R. T. GLAZEBROOK, F.R.S., F.Ae.S.

IN the first part of his lecture, the author, with the assistance of lantern slides, gave a brief account of the development of the aeroplane, from Henson's machine, which was designed in 1842 and never constructed, to the Santos Dumont aeroplane of 1906; and then proceeded to deal with the work of experiment and scientific research conducted at the N.P.L., demonstrating that an extraordinarily high order of accuracy is attained, and that the results obtained correspond with almost mathematical exactness when the observations are made in either of the two existing wind channels by different observers.

The second section of the lecture was devoted to the consideration of laws connecting the forces on the model with those upon the

in terms of the velocity of its centre of gravity along the axes of reference and of the angular velocities of its centres of the machine about these axes. This expression involved a number of constants, quantities which depend on the shape and dimensions of the machine, not on its motion. If we know the energy, values can be found for the forces and moments on the machine—these involve the same constants—and the equations of motion can then be formed. Their solutions can be obtained at any rate in certain

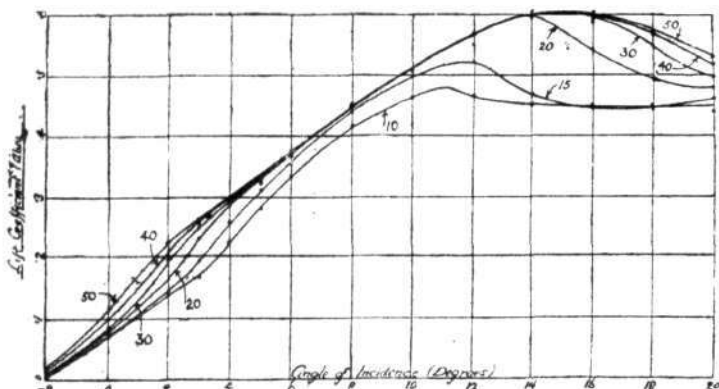


Fig. 1.—Variation of lift coefficient of a model aerofoil with changes of speed.

model itself—the laws of similarity. The lecturer observed that experiment had proved that the force on a surface due to the wind was not proportional to the square of the speed, but that the lift/drift and the lift coefficient increased with increase in speed (see Figs. 1 and 2). Lord Rayleigh, however, had called attention to the fact that if K in the expression for wind pressure— KSV^2 —be not constant, it must depend upon the quantity $(LV \div v)$ where V is the velocity of the current, L some linear dimension of the surface, and v is the kinematic viscosity of the air. Hence, if the values of K as found for an aerofoil in a given position but for different

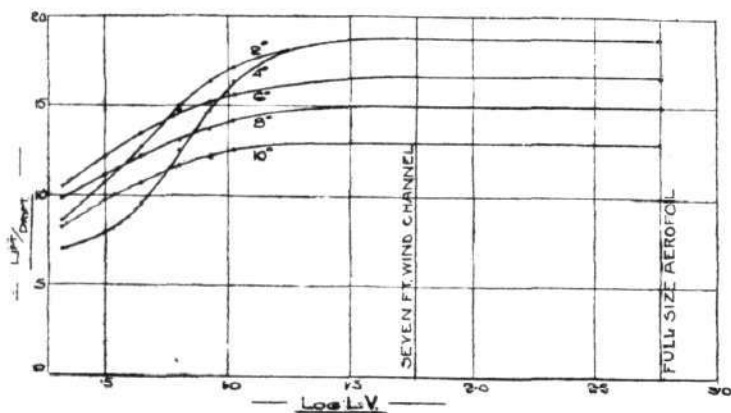


Fig. 3.—Variation of lift/drift with LV , where L is the length of chord in feet and V is the velocity in feet per second.

values of the velocities are plotted against LV , the points ought to lie upon a smooth curve, and the form of this curve will determine K as a function of LV . This was illustrated in Fig. 3 where the values of the lift/drift ratio are plotted against LV (or rather, for convenience, against $\log LV$) for the series of experiments shown in the preceding curves—the points on the line marked "Full Size Aerofoil" being taken from the results of experiments at the Aerodynamical Laboratory of the University of Paris on full-sized aerofoils of the same design as the models used in the preceding experiments, which were made to a $\frac{1}{10}$ scale. It will be seen that the values for the coefficients found from the 50 feet per sec. observations in the channel do not differ greatly from those belonging to the actual machine.

Dr. Glazebrook next considered the problem of the *Stability of Aeroplanes*, remarking that it was most complex, and depended on finding an expression for the energy of the machine in any position,

* Digest of the Wilbur Wright Memorial Lecture, delivered before the Aeronautical Society on 20th inst.

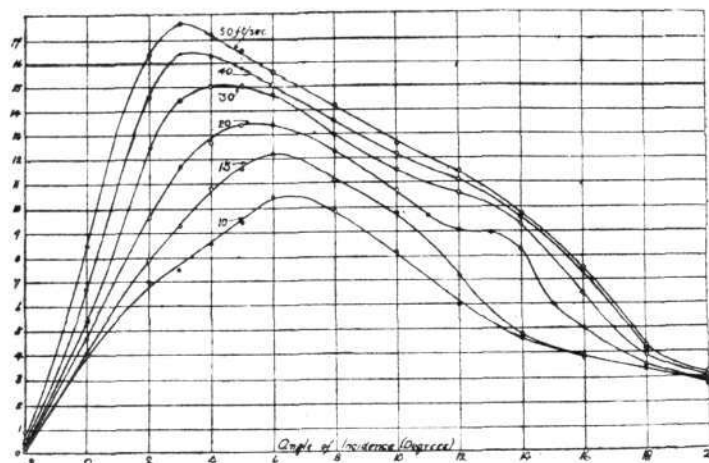


Fig. 2.—Variations of lift/drift of a model aerofoil with changes of speed.

cases of importance, but to utilise the results we require to know the numerical values of the constants just referred to and to determine these we must have recourse to the model experiments. By means of the balance the forces on the model can be measured; these forces can also be expressed in terms of the constants, and the wind velocity, and hence we can find certain of the constants applicable to the aeroplane considered. Further experiments of a somewhat different character are required to determine the values of the rest of the constants or coefficients in the energy expression—the rotary derivatives, as they are called; but by means of the model experiments all these can be found, and on substituting the values in the equations of motion, the nature of the motion can in many cases be determined by the solution of the equations.

In determining the stability coefficients a model is supported in the channel in various positions relative to the direction of the air current and the forces measured; the axes or direction of reference are taken as shown in Fig. 4. The angle of pitch is positive when the

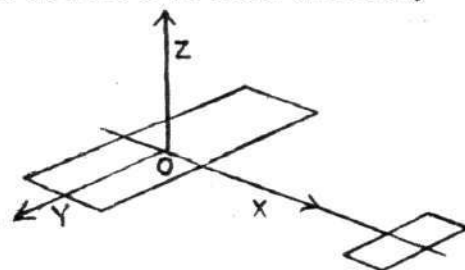


Fig. 4.—Axes of reference.

the machine rises, the angle of yaw is positive when the machine turns to the right, and the angle of banking which properly accompanies this turn to the right will also be positive.

Fig. 5 gives the forces and moments which are produced in the plane of symmetry when the attitude of the machine to the wind changes, but without yawing, while in Fig. 6 are shown the forces and moments produced by yawing without altering the angle of pitch, so that the flight is horizontal. The wind speed for which the forces are given is 30 ft./sec. Starting from zero pitch angle the longitudinal force falls as the angle of attack is increased, reaches a minimum at about 8° , and then rises again rapidly. The normal force increases regularly as the angle of attack increases, while the pitching moment increases in amount but is negative, that is to say, it tends to reduce the angle of attack. The machine is stable longitudinally, so far as pitching moment on it is concerned, but further investigation is required before the motion can be completely determined. Turning now to Fig. 6 we see that as the angle of yaw increases the longitudinal and normal forces are somewhat reduced though the changes are not at first large, but a considerable negative lateral force is brought into action, if the machine turns to the right the side force is from left to right, the machine side-slips in the direction in which it is turning. There is a yawing couple N which is negative, i.e., tends to reduce the angle of yaw and turn the nose of the machine into the wind, at the same time a

positive rolling moment L is produced, the machine tends to bank as required for the turn, and also at first we have a positive pitching moment M , the angle of attack is increased, and the nose of the machine rises.

Fig. 7 gives the curves of pitching moment of a biplane model for various settings of the elevator in the tail, the wind speed in this case being 40 ft./sec. Without the tail plane the angle of attack for horizontal flight would be slightly negative, but the machine in this state would be unstable, any increase or decrease in the angle of attack causes a moment tending still further to increase or decrease the angle respectively and so to disturb the machine. With the tail plane the machine flies though with no great longitudinal stability when the elevator is not raised. The effect of raising or lowering the elevator is shown in the curves. Positive angles correspond to an elevation of the elevator tending to raise the nose of the machine.

Curves were then given in which the longitudinal moment about the c.g. was plotted against the inclination of the machine to the

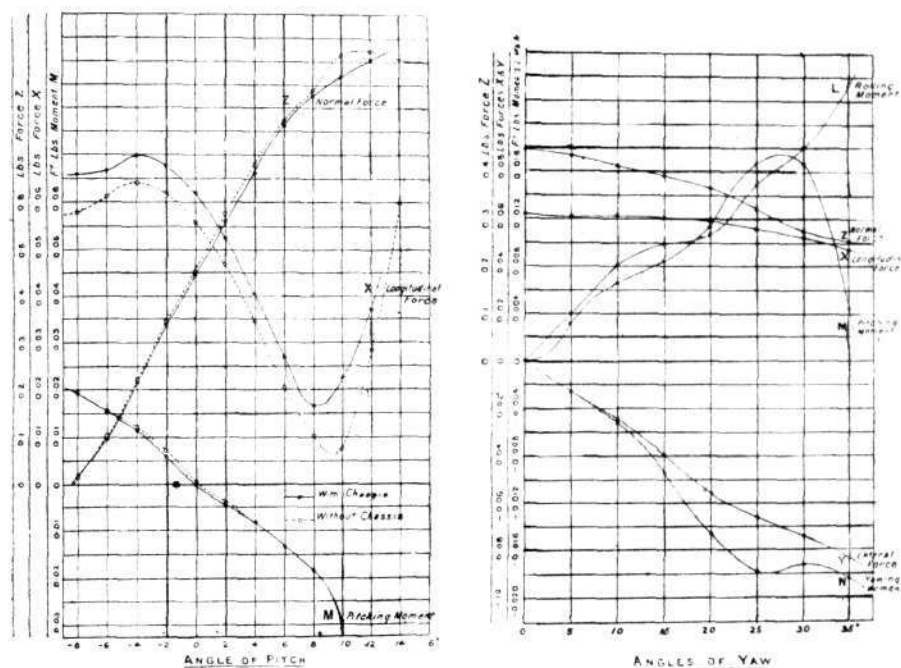


Fig. 5.—Variation of forces and moments on model Blériot type monoplane with angle of pitch. Fig. 6.—Ditto with angle of yaw. Fig. 7.—Pitching moment for complete machine.—Wind speed 40 ft. per second.

wind. These indicated that the effect of the tail on the longitudinal balance is much less than would be anticipated if it were supposed that the air current is not deflected by the main planes and is free to act on the tail as though the main planes were absent—the moment as measured being only one-half of that calculated on the latter assumption. This required further investigation.

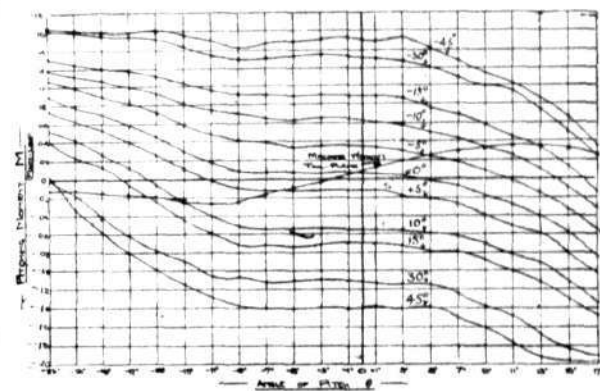
So far it had been supposed that the aeroplane is in steady flight in a uniform wind. The author next dealt with some aspects of disturbed flight in a non-uniform wind. He said in the first place we may deal separately with the motion of the machine in the vertical plane of symmetry, the longitudinal motion, as it is called, and its lateral motion or motion perpendicular to that plane. If the longitudinal motion be slightly disturbed and the machine be stable, two kinds of oscillations are set up; one kind consists of rapid oscillations, both of the machine about its centre of gravity and of the centre of gravity itself. Ordinarily, in a stable machine, these are quickly damped down and give no trouble. But besides these the centre of gravity of the machine itself describes an undulating path; the period of these undulations is much longer than in the first series, though for a stable machine the amplitude of the oscillation is gradually reduced and the machine, if no other changes have been made, gradually recovers its normal flight path. Mr. Lanchester has called these slower oscillations the phugoid oscillations. If the machine is not stable, when disturbed from its normal path, its motion will diverge more and more from the condition of steady flight, and this divergence may take place continuously or it may happen that a series of oscillations of increasing amplitude is set up which ultimately become so large as to cause disaster. It is not possible to predict exactly what will happen in a given case without a knowledge of the relative values of the constants or coefficients already referred to, but if these be known the equations can be solved numerically and the details of the flight can be predicted.

We can go further than this, as Mr. Bairstow has shown in the beautiful model experiments he carried out recently before the Society, and determine the alterations which must be made in the machine to produce modifications in the conditions of its flight.

Now we have already seen in Figs. 5 and 6 the curves of forces and moments from which the constants can be determined for the model monoplane which has been exhibited. Mr. Bairstow and Mr. Nayler have recently determined the coefficients for this machine and used it to determine its motion under a variety of circumstances, and I propose to give some account of their results.

Let us suppose that the machine is flying horizontally against a uniform wind, and at a certain moment the horizontal velocity of the wind changes by a known amount, u_0 say, and remains permanently at its new value. Fig. 8 gives the solution of our problem; the longitudinal motion only is affected and the results on the components of this motion are shown in the curves. The quantities we have to deal with are u , the change in the horizontal velocity relative to the surrounding air; w the normal velocity, θ the pitch angle or angle of attack, and q the angular velocity of the machine in the plane of symmetry.

At a certain moment the velocity of the wind changes by an amount u_0 . At that moment, therefore, the velocity of the aeroplane relative to the air is increased by an amount u_0 , but this increase rapidly dies away, and after five seconds has become zero; the velocity goes on decreasing for five seconds more, and at the end of some ten seconds has reached its minimum value, which is less than the original steady value by about $\frac{1}{2}u_0$. The velocity then



increases again for some ten or eleven seconds and the changes follow a regular periodic curve of rapidly decreasing amplitude, and after some 40 or 50 seconds are completely damped out. Dealing next with w , the normal velocity, we find it starts from zero, but rises rapidly in a fraction of a second to its maximum amount, about 0.2 of u , and then dies away rapidly in the same manner as u .

The angular velocity q is small, so small that the curve is drawn to give 100 times q , and this follows practically the same law as w , while θ , the pitch angle, increases for five seconds and then decreases to pass through periodic changes of decreasing amplitude and of about 22 seconds period.

The motion is stable; the complete calculations show that the rapid oscillations in this case only affect w and q , and that they die out in less than a second, while the other disturbances are those arising from the phugoid motion of the machine. Thus, in this case the machine when struck by the horizontal gust loses longitudinal speed at first, and after passing through a series of changes of velocity, settles down after a few oscillations in less than a minute to its original speed relative to the wind. This loss of speed is accompanied by an initial increase of normal velocity; the machine rises for a fraction of a second, acquiring a rapid positive angular velocity, but these motions soon change sign and die away like the horizontal velocity. The nose of the machine rises for five seconds, at first rapidly, then more slowly, and this oscillation dies down in the same manner as the others.

The next figure, Fig. 9, gives the changes due to a downward gust, w . Relatively to the air the machine acquires an upward velocity, w_0 , which dies down in about one second and is followed by the slow phugoid changes as before. The changes in the other quantities are shown in the curves, and the motion of the machine can be traced as before. By combining the results of these two diagrams we can find the effect of a steady gust striking the machine in any direction in the plane of symmetry. In a similar way we

can find the effect of a change in the direction of the wind or of an alteration in the propeller thrust or of the position of the elevators. The last is shown in Fig. 10, in which it is supposed that the elevator is turned so as to cause the machine to dive.

The next two figures indicate what the motion will be in two cases of lateral disturbance. This motion, in the particular machine dealt with, is unstable. Its expression involves three terms. One of these corresponds to a periodic oscillation rather heavily damped, having for one machine a period of about six seconds; the second to a considerable disturbance in certain of the co-ordinates, which however subsides or dies out very rapidly; and the third to a

as does v , the side-slip velocity, which takes place in the negative direction. Thus, the machine turns to the right, increasing the angle of banking and side-slipping outwards and downwards at the same time. In all the descriptions above it has been assumed that the controls are not touched, but a comparison of Fig. 12 with the curve obtained when the effect of warping or of turning the rudder are considered show that the control of such a machine is not easy.

Thus, Messrs. Bairstow and Naylor have solved the following problems:—An aeroplane is in flight in the air—(1) At a given

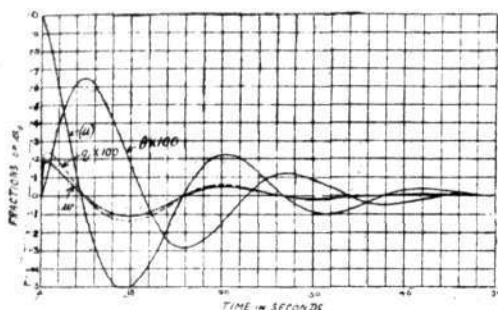


Fig. 8.

Fig. 8.—Disturbed longitudinal motion of an aeroplane ($u = u_0, w = 0, q = 0, \theta = 0$ when $t = 0$).

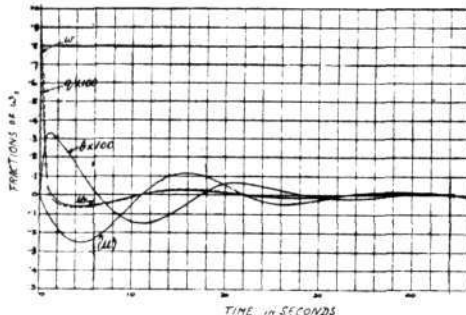


Fig. 9.

Fig. 9.—Disturbed longitudinal motion of an aeroplane with elevator raised— $w = w_0, q = 0, \theta = 0$ when $t = 0$.

Fig. 10.—Disturbed longitudinal motion of an aeroplane with increase in upward velocity of aeroplane and = w of mathematics. (u) = increase in velocity of relative wind and = $-u$ of mathematics. θ = inclination of propeller axis to horizontal. q = angular velocity of turning machine from Z to X. When positive it increases the inclination of propeller axis to the horizontal. (u) = $-3.40e, w = -e, q = 0, \theta = 0.0206e$ when $t = \infty$

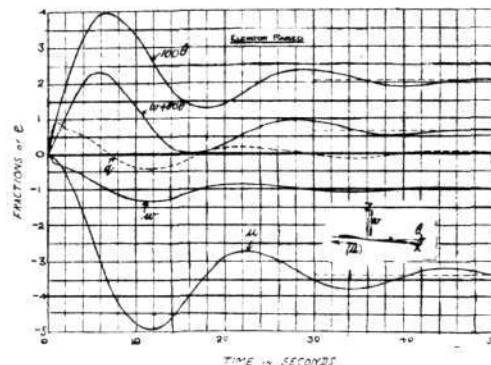


Fig. 10.

gradually increasing disturbance which gets larger with the time, according to an exponential law.

In Fig. 11 is shown the effect of a side wind, v_0 , striking the machine on the left-hand side. The curves show chiefly the effect of the slow oscillation, though the rapid increase in the value of p , the velocity of rolling, is due to the subsidence term. The machine quickly picks up the velocity of the wind; after some seven seconds v , the relative sideways motion, is very small, but it gradually increases, and after about 40 seconds has reached some 9 per cent. of the original disturbance. Unless the controls are altered the side-slip will continue to increase. A large angular velocity of

instant the wind changes either in speed or direction or both, and the new conditions remain for a time steady. The motion of the aeroplane is determined by the curves given in the paper; (2) at a given instant the controls of the aeroplane are altered. The ensuing motion is defined by other curves; and (3) by a suitable combination of the curves the effect of change of wind and change of control occurring simultaneously can be determined.

They have however gone much further than this. The wind does not change instantaneously and remain steady. Let us investigate the effect of supposing that at the end of each consecutive second there is a change, but that during each second the wind is steady.

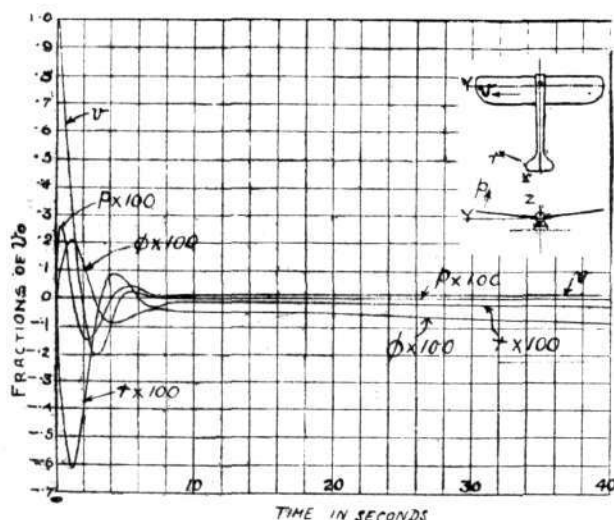


Fig. 11.

Fig. 11.—Disturbed lateral motion of an aeroplane $v = v_0, p = 0, r = 0, \phi = 0$ when $t = 0$.

Fig. 12.—Disturbed lateral motion of an aeroplane $v = 0, p = 0, r = 0, \phi = \phi_0$ when $t = 0$.

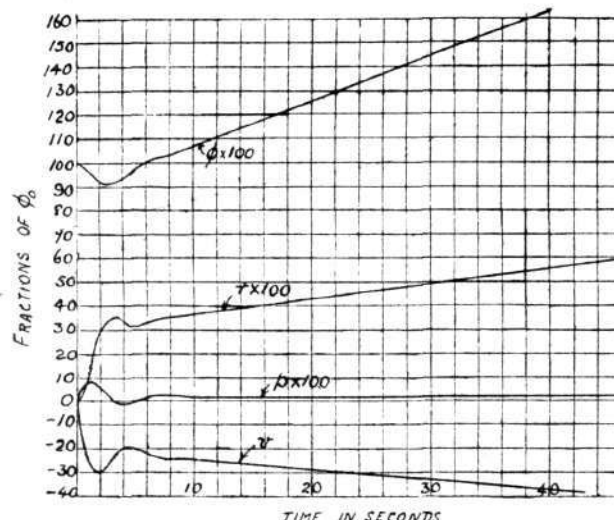


Fig. 12.

roll, p , is started almost immediately, and at first this gradually dies down, but after six seconds or so the divergence term begins to tell and the rolling continues to increase unless checked by the pilot. Again, r , the velocity of yaw is at first negative, the machine yaws to the left, a motion opposite to that which corresponds to the bank; after a time this is reversed, and yaw and bank increase together. In Fig. 12 we have recorded the effect of sudden banking through an angle ϕ_0 . The effects of the subsidence and oscillation terms are not large, but those of the divergence terms are very great; after 40 seconds the angle of banking exceeds its original value by 63 per cent., while r , the velocity of yaw, also increases rapidly,

Clearly this is a closer representation of the facts, and if we go further and take as our divisions of time, not seconds, but small fractions of a second, we get a proper representation. We start with a knowledge of the motion of the aeroplane and the air at the commencement. Certain changes occur suddenly, and then for one second the atmospheric conditions remain steady. We can determine the motion of the aeroplane at the end of that second; then further atmospheric changes occur, treating the commencement of the second second as our origin of time, we know the motion of the aeroplane at that instant and our curves applied again will give it at the end of the second second, and we can proceed thus for each

consecutive second and so find the resulting motion. The operation is, of course, a very tedious one if the motion has to be investigated over any long period of time; its value consists in the fact that we can thus predict what will be the motion of an aeroplane having a definite amount of stability when moving in gusty air, if we analyse it thus for a few minutes, and we can thus determine whether either the safety of the machine or the comfort of the passenger require a modification of the stability.

Dr. Glazebrook then referred to some experiments carried out by Dr. Stanton, to ascertain the variation in the velocity of the wind at short intervals of time. The curves obtained had been analysed by

Messrs. Bairstow and Naylor, and the effects of the varying wind velocity upon the motion of an aeroplane were indicated with the aid of diagrams, showing that the elevator can, without difficulty, be so manipulated as to cancel the effect of the gusts.

The author concluded by briefly indicating some of the more important conclusions of the Advisory Committee for Aeronautics in regard to the influences that affect the stresses induced in various parts of an aeroplane, and call for a higher factor of safety, and suggested that although there were at present great difficulties in the way, a factor of safety of 12 (based upon flight in still air) should be aimed at.

FOREIGN AIRCRAFT NEWS.

Another Record for Garaix.

HAVING to demonstrate the Paul Schmitt biplane at Juvisy in connection with the Security competition on Saturday, Garaix decided to fly it over from Chartres and incidentally attempt a new world's record. He therefore took up three passengers, M.M. Paul Schmitt, Frangeois and Galibourg, and with a total useful load of 544.9 kilogs. the aeroplane covered the 70 kiloms. from Chartres to Juvisy in 42 mins., so that the speed was 100 k.p.h.

The Next Paris Aero Show.

It has now been decided that the next Paris Aero Show shall open on Saturday, November 21st, and close on Sunday, December 6th. Mr. Andre Granet has been elected Commissaire General to take charge of all arrangements in connection with the Salon.

Another Projected Trans-Atlantic Flight.

It is reported from Nice that Van den Born, who will be remembered as one of the first H. Farman pilots, is making arrangements for an attempt to secure the *Daily Mail* £10,000 prize. Van den Born proposes to cross the Atlantic from Konakry in French Guinea to Pernambuco in Brazil, which is a little shorter than the more northerly route. A special machine is being built for Van den Born near Nice.

Quick Climbing on a F.B.A.

WHILE testing a 100 h.p. Gnome-F.B.A. flying boat over the Seine at Bezons on the 23rd inst., Burri, who was accompanied by a passenger, climbed 2,100 metres in 24 mins.

French M.P. Flies.

ON an R.E.P. 80 h.p. monoplane, Molla, on the 22nd inst., took M. Girod, a member of the Chamber of Deputies, from Vincennes to Soissons, the distance of 120 kiloms. being covered in 1 h. 5 m. After giving a lecture to the students at the college, M. Girod returned by the aerial way to Vincennes.

Another French Aviatress.

LAST week at Buc, Mdle. Picard, who has been at the Blériot School for some time, successfully qualified for a pilot's certificate.

Chevilliard has a Mishap.

WHILE making a cross-country flight from Gelsenkirchen to Dusseldorf on the 23rd inst., Chevilliard had a fall when near the Krupp mansion at Essen. The pilot escaped with a dislocated arm, but the passenger, Herr Wulfen, sustained severe injuries.

Aerial Touring by Farman Brothers.

ON Friday last, Maurice Farman, accompanied by his brother Diok, made a flight from Buc to Tillieres-sur-Avre in the Eure district and back.

A Nieuport Superior Pilot.

SAPPER BAUMONT, on the 21st inst., completed his qualifying flights for the French superior certificate by a trip from Villacoublay to Mailly Camp and back, on a Nieuport monoplane.

Additional Loopers.

AT Chateaufort, on the 20th inst., the Chilian aviator, Page, looped the loop on a Bathiat-Rhone monoplane; while at Moscow, on the same day, Wasilieff looped alone and with passengers on a Morane.

On the 22nd inst., Le Bourhis, who recently made some parachute descents from an aeroplane, and is now one of the Blériot instructors at Buc, looped the loop for the first time.

An M. Farman for Amundsen Expedition.

THE Norwegian explorer, who has been making a serious study of aviation with a view to utilising aeroplanes on his next Polar trip, has purchased a Maurice Farman biplane. Capt. Amundsen has asked Capt. Sem Jacobsen to fly the machine from Paris to Norway, and on Saturday last the first stage from Rheims to Liege was completed, stops being made at Rocquigny and Namur.

Verrier Returns to Paris.

ON the 20th inst., Verrier, on his H. Farman, completed his return trip from Berlin by flying from Dusseldorf to Buc in exactly three hours, the average speed working out to about 150 k.p.h.

Looping on a Vendome.

GIBERT, on a Rhone-engined Vendome monoplane, looped the loop at Gravanches, near Clermont-Ferrand, on the 24th inst. He made similar flights at Montlucon on the 21st inst.

M. Maeterlinck's Impressions.

"It is a morning prayer in an azure cathedral," M. Maurice Maeterlinck's epigrammatic summing up of his impressions of his first flight on an aeroplane, is in the poetical language which one would expect from the great writer. The flight was made at Eze near Nice on the 21st inst. on a machine piloted by Maicon, who was recently appointed by Mr. Paris Singer as his family pilot.

Arrest of M. Clement-Bayard.

THE arrest of M. Clement-Bayard at Cologne, on Friday of last week, on a charge of espionage, would appear to have been due to a regrettable blunder on the part of someone, but it is to be hoped that the enquiries which are now being made by the French and German Governments will clear up the affair satisfactorily.

Aeroplanes at Belgian Review.

AT the review held at Brussels in honour of the King of Denmark on the 23rd inst., six H. Farman biplanes, piloted by Army officers, carried out a series of evolutions above the parade ground.

German Pilots in 1913.

FIGURES which have been issued by the German Aerial League show that during last year 293 pilot certificates were issued. Of these, 113 were gained on biplanes and 180 on monoplanes. In the classification according to the machines on which they were gained, Grade heads the list with 39, Rumpler second with 30, Albatros third with 26, and Bristol fourth with 22. Eighty-two certificates were granted to military officers. Johannisthal was the most favoured aerodrome, 142 certificates being gained there, while Bork was second with 30.

Flying Over the Baltic.

ON the 19th inst., an aeroplane, carrying two German officers, started from Heligoland and flew to the island of Norderney off the Dutch coast, the distance between the two places being about 100 kiloms.

Double Fatality in Germany.

WHILE flying through a thunderstorm an aeroplane, piloted by Lieut. Böder, with Lieut. Dernhardt as passenger, fell from a height of 1,500 metres near Wellendorf, and both officers were instantly killed.

Chanteloup in Norway.

DURING last week Chanteloup gave a series of exhibitions of looping the loop, &c., at various places in Norway on his Caudron-Rhone. His flights at Trondhjem, on the 22nd inst., were witnessed by the King of Norway. On Sunday last Chanteloup was flying at Stavanger.

Long Flight in Russia.

A RUSSIAN military pilot, Nesteroff by name, started from Kieff at 3.30 a.m. on Sunday and finished at Gatchina at 9.30 p.m., having landed twice on the way. His flying time for the 1,400 kil. (870 miles) was 8½ hours.

Fatal Accidents in America.

WHEN making a test flight with a new biplane at Utica, N.Y., on the 8th inst., Precival Van Ness apparently tried to make the machine climb too steeply, with the result that it turned turtle and fell 50 ft. The pilot was pinned beneath the wreck and died from his injuries later in the day.

On Saturday last Mr. Robert Cowan fell with his balloon into the river at Alton, Illinois, and was drowned.

The Scandinavian Waterplane Circuit.

DETAILS are now to hand regarding the competition for waterplanes, which is to be held next August, over a course from Schwerin, in Germany, to Christiania, in Norway. Starting from Schwerin, the daily stopping places are: August 21st, Warnemunde, 100 kiloms.; August 22nd, Copenhagen, 180 kiloms.; August 23rd, Aarhus, with a stop at Helsingborg, 190 kiloms.; August 25th, Aalborg, 140 kiloms.; August 27th, Gothenburg, 150 kiloms.; August 28th, Tonsburg, 190 kiloms.; August 30th, Christiania, 80 kiloms. August 24th, 26th, and 29th will be spent at Aarhus, Aalborg, and Tonsburg respectively. The prizes total to £3,200, of which £280 will be distributed equally among those who get to Warnemunde, £320 among those who reach Copenhagen, £600 at Aarhus, £400 at Aalborg, £400 at Gothenburg, £400 at Tonsburg, and £800 at Christiania.



35-Hour Voyage by the "L3."

THE new Zeppelin airship "L3," built for the German Navy, left Friedrichshafen at 7.16 a.m. on the 22nd inst. for a trial trip, which it was intended should occupy 36 hours. After cruising over the neighbourhood of Lake Constance for some hours, the airship passed over Basle at 10 a.m., at 6 p.m. she passed Frankfurt, at 9.30 p.m. Metz, at 10.30 p.m. Bingen, at 2 a.m. the next morning Bremen, at 4 a.m. Heligoland, then back to Hamburg, and reached Potsdam at 9.30 a.m. After cruising over Berlin for some time a visit was made to Stettin, while the vessel landed at Johannisthal at 6.15 p.m., having been in the air for 34 hours 59 mins. Between Metz and Bingen the airship is said to have covered 150 kiloms. in the hour.

New French Airships.

DURING the next few months the French Army hope to have several new dirigibles in service. At Toul a new Lebaudy airship, which will be equipped with three groups of 150 h.p. Salmson motors, is being inflated, while next month at Epinal a new Astra-Torres will be inflated. She will be of 23,000 cubic metres capacity, and will have four 250 h.p. Chenu engines.



CORRESPONDENCE.

Brakes on Aeroplanes.

[1862] It seem to me a surprising thing that up to the present so little has been done in the way of controlling the speed of an aeroplane after landing by means of a brake. With the exception of the Bristol, Albatros, and Sanchez-Besa machines, no real endeavour appears to have been made in this direction.

It is obvious that, in many cases, machines and even lives may be saved by the use of a brake acting on the chassis wheels to curtail the length of "roll" following upon landing. For military and cross-country machines I consider brakes a necessity. Within certain limits, a pilot never knows how small a field he may have to land in, and having landed, how quickly he may require to pull up. As an instance, let us take the recent accident at Northallerton. According to evidence, the machine touched ground well inside the field, and I am convinced that a prompt application of a brake to the wheels of the machine would have greatly reduced its speed, and would very probably have prevented its overturning.

In case of a landing being made where no help could be obtained to hold back the machine or start the engine, the brakes could be put hard on. The pilot could then start his engine, get into his seat, release his brakes, and get away.

I have designed a brake, which can be fitted to any wheels, and used on any chassis. I intend to offer the designs to the Royal Aircraft Factory, and I shall also be pleased to give particulars and sketches to any constructor who cares to apply, for I feel that the universal provision of a brake to the chassis wheels would be another step onward towards the ultimately perfect aeroplane.

St. Mary's Mount, Leyburn,

Wensleydale, Yorks.

FRANK BROOK.

Turbine Blade Camber.

[1863] The enclosed cambered section (full size) will perhaps interest your readers as it represents the blade of a modern Parsons steam turbine. I re-visited these works, where I was once a pupil, a few days ago, and was naturally much impressed with the great increase in the size of the engines now being constructed compared with those that were built whilst I was working in the shops. Incidental to this increase in engine size is an increase in the size of the blade and those now used at the low pressure end of a 20,000 K.W. Set are sufficiently large to indicate the profile of the camber with great distinctness. I took away with me a section



Map of the Scandinavian Waterplane Contest.



of one of these blades and had Sir Chas. Parsons' permission to use it as an illustration in a lecture that I gave in Newcastle that evening. Under the circumstances, I am sure he would have no objection to its publication in FLIGHT.

Coventry, May 11th.

A. E. BERRIMAN.

Climbing Speeds of Machines.

[1864] As Mr. S. C. Shepley-Part has "challenged" the accuracy of the conclusions I drew with regard to the climbing speeds of aeroplanes in letter 1854, I should like space in your columns in which to vindicate the same. Your correspondent in letter 1857 accuses me of making the absurd mistake of neglecting the fact that the speed of the machine must be measured relative to the air. I beg to state that I did not fall into this "trap," as Mr. Shepley-Part terms it; but I stated that a propeller working efficiently on a machine whose air speed is 60 m.p.h., would not work efficiently with a following wind of 40 m.p.h., and so the machine would not attain 60 m.p.h. air speed; or, as I expressed it in my last letter, 100 m.p.h. land speed. So the reduction of propeller efficiency would cause a reduction in climbing speed. It would also be of interest to know on what grounds your correspondent bases his theory as to a machine being virtually heavier when climbing than in horizontal flight.

Ely.

ALFRED M. COATE.

Flying Accident Fund.

[1865] Having accepted the Honorary Treasurership of the Flying Accident Fund, inaugurated by the Women's Patriotic Aerial League for the assistance of the widows or dependents of pilots killed or permanently disabled, and of which Field Marshal Lord Roberts and the Marquess of Tullibardine, Chairman of the Royal Aero Club, are patrons, I venture to make an appeal on behalf of an undertaking the necessity for which has been so painfully brought home to us during the past few weeks.

I have already had to thank you, sir, and your readers for assisting me in the collection of £330 for the widow and orphans of Lindsay Campbell, the Australian aviator, and £1,420 for the family of the late Col. S. F. Cody, to which Her Majesty Queen Alexandra was graciously pleased to contribute £50.

All contributions received by me at 25, Denison House, Victoria, S.W., will be thankfully acknowledged in the Press.

H. S. MASSY, Colonel,

Hon. Treasurer.

May 26th.

Models

Edited by V. E. JOHNSON, M.A.

Some Experiments with Steam Plants for Models.

THE writer has recently been making some experiments with aerial propellers driven by steam in which the boiler (of the ordinary type) is fitted with a steam gauge in order to acquire some really reliable knowledge of the steam or air pressure necessary to drive a propeller at some given speed. The boiler used was of copper, brazed, vertical with one central tube; some 3 to 4 ozs. of water were used. The boiler was heated by a gas ring containing 16 holes, fed by a half-inch gas pipe, connected in turn with a larger one direct off the main. The engine used was a double acting single cylinder one of the toy locomotive type, fitted with a slide valve of the cylinder type. Its weight, $2\frac{1}{2}$ ozs. The propeller used was a 12 in. one, central type. In one case in a $\frac{1}{2}$ -min. run, in which the pressure fell from 60 to 40 lbs., the mean being 50 lbs., the number of revolutions of the propeller was at the rate of 1,200 per min. In another test in which the mean steam pressure was 52 lbs., and the length of run the same, the r.p.m. were 1,360. In another trial in which the initial pressure was 100 lbs., falling to 50 lbs. at a mean pressure of 70 lbs., the r.p.m. were also 1,360. At first sight this seems curious, but can be accounted for, I think, on the score of leakage on the part of the engine, which was not, of course, of the really high-pressure type.

In another case in which a pressure of approximately 60 lbs. was maintained throughout the run, the r.p.m. were about 1,560. The speed indicator used, so far as its moving parts were concerned, was of almost no weight or friction, and could not have appreciably delayed the number of revolutions per minute. The thrust of the propeller at the above speeds has not yet been taken, but this will be done later on.

The employment of a pressure gauge is most interesting and instructive, and we hope others will carry out similar experiments with the same. The greatest difficulty was experienced in keeping up the pressure. The cubical contents of the boiler was 6 ozs. of water.

The gas stove gave a run of 3 minutes and a half at a mean pressure of 40 to 45 lbs., using 3 ozs. of water. The r.p.m. of the propeller in such a case was between 1,200 and 1,300. The little engine worked well and showed no signs of giving out even at 100 lbs. pressure. In some earlier experiments an engine 0.75 of an ounce in weight, single acting oscillating, was used, and without difficulty drove the same propeller up to 1,000 r.p.m. The steam pressure was not taken. The heating agent was a vapour lamp,

it along]. This is sufficient to fly an 8-oz. model. Now, taking a model of the worst type of flying-stick. Let us put the plant at $4\frac{1}{2}$ ozs. and the fuel at $1\frac{1}{2}$ ozs. This leaves 2 ozs. for the rest; not much certainly, but still possible. Now for the power plant. The engine presents no difficulty, and can be put down at $\frac{1}{2}$ oz. The lamp ditto at 1 oz. We have then 3 ozs. left for the boiler, and in this we appear to have but little choice other than a very small pressure-fed one of the flash boiler type and one of a very light tubular type. In the latter case it is extremely difficult to keep down the weight. The tube must be seamless and brazed. The water fuel carried would only be 1 oz. and the heating fuel $\frac{1}{2}$ oz. Length of flight 30 to 40 secs. I am perfectly prepared for this idea to be ridiculed, but as a matter of fact I have progressed much nearer its solution than in the experiments related above.

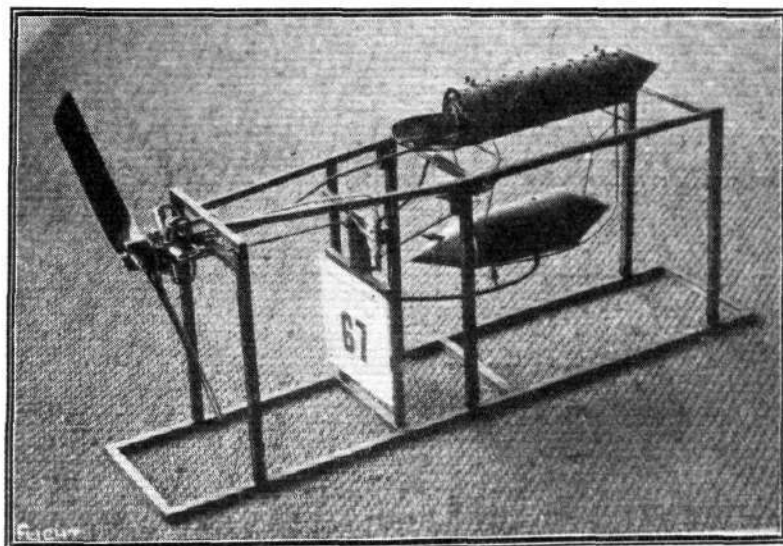
The ordinary type of flash boiler and lamp is constructed on altogether wrong principles so far as obtaining anything like *maximum uniform heating effect*. The manner in which the coils are arranged greatly interfere and shield one another, with the result that whilst parts of the tubing are at red or almost white heat, parts are comparatively speaking cool. Heating by means of flame is one which is extremely wasteful of energy. Some remarkable results have been obtained during recent years with what is known as surface combustion or heating, in which the burning gases are caught in suitable substances and rendered white hot (like an incandescent mantle), which latter in turn heat the desired body—round which they are packed—in a far more economical method than when bare flames are employed, in which enormous losses are entailed by radiation only.

Some Further Experiments.

Some further experiments were carried out on the losses entailed by friction in the case of very small steam engines. These were found in several cases to amount to more than *fifty per cent.*, which I think goes far to explain how it is that good results (at high speeds) can be obtained from engines whose pistons rattle in their cylinders.

Of course I do not maintain that such do not waste steam. But which is the worst evil—loss of efficiency due to wasted steam, or to friction owing to tight packings, &c.? So far as my experiments go (always, of course, in the case of small motors), the former is the lesser evil. In high-speed engines the actual rush or momentum of the steam or gas is all-important. Its mass may be very small, but it moves at a high velocity. A really loose-fitting piston for a low-pressure engine would of course be useless.

I have referred to the difficulty of keeping up a high steam pressure, and the manner in which, in boilers of small capacity, the pressure falls; a 20 lb. drop in 10 secs. was quite common. This shows (in the case of compressed air motors) how rapidly the pressure must fall, for in this case

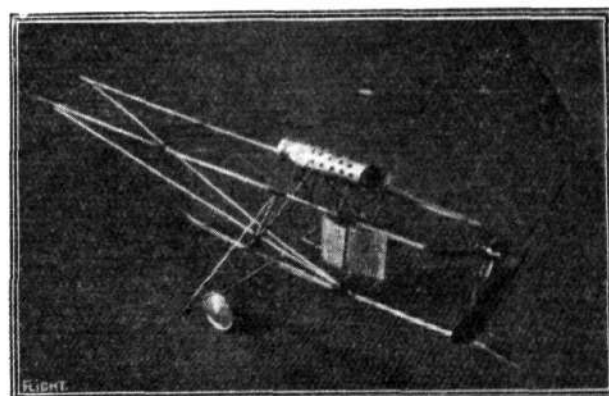


Mr. C. L. Pratt's Olympia steam-driven model.

methyated spirits being the fuel. This engine was soft soldered, and although I have not as yet taken the other to pieces it is, I presume, the same.

Some Deductions from the Above.

Let us assume for a moment that a centrale propeller 12 ins. in diameter at 1,360 r.p.m. gives a thrust of 2 ozs. [perhaps some reader who knows from experiment just what it is will kindly send



Mr. D. A. Pavely's Olympia steam-driven model.

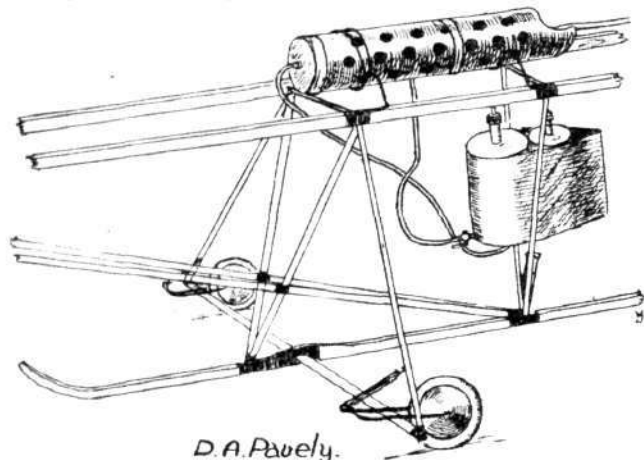
nothing is being done, as in the case of the water boiler, to keep it up.

Olympia Steam-driven Models.

Quite a number of steam-driven model aeroplanes and plants were exhibited at Olympia, although these were unfortunately unable to give a good account of themselves at the official tests, such, that is, as were submitted; we take their advent at Olympia as an extremely healthy sign. It clearly shows that there are a number

of aeromodellists who have grown tired of rubber as a motor power and desire to attempt a higher and more engineering class of work. The difficulties are very great, only those who have tried them practically know how great they are, but they, like others, will be overcome in time and we shall have at our disposal a small and cheap power plant, cheap that is I mean to construct, and its construction will not be too difficult for an amateur to undertake who has had some experience with tools. It will also be possible to buy its parts in the rough and finish and fit them together just as in the case of other models.

Mr. H. H. Groves was the first to obtain any real success with such a type of plant, consequently it is only natural that others should have followed it more or less closely. Although it has been shown in the hands of an expert to give good results, it is not by any means an ideal plant, and is capable of great improvement. The earlier



Sketch showing the power plant of the Pavely steam-driven model.

type was fitted with a pressure-fed flash boiler, and the later with a pump-fed one. A pressure-fed boiler, save for short runs of some 30 to 40 secs. soon results in a serious drop in propeller thrust, unless the boiler tap be opened more.

With a pump-fed one, the valves appear to be a constant worry and nuisance, owing mainly to water deposit. If this really be the cause, surely the use of distilled water would overcome this. Another source of difficulty is a single flame lamp, *i.e.*, a blow lamp with but one orifice. The tiniest difference in this makes all the difference to the one resultant flame, on which everything depends. The shielding effect of the coils of steel piping on one another has already been referred to. Quite remarkable results can be obtained with such a type of plant so far as propeller speed and thrust are concerned, when the plant is working at its best. But even in the most successful type of this plant yet evolved, we believe we are correct in saying that the boiler floods after a two minutes' run.

KITE AND MODEL AEROPLANE ASSOCIATION.

Official Notices.

British Model Records.				
Single screw, hand-launched	Duration	D. Driver...	85 secs.	
Twin screw, do. ...	Distance	R. Lucas ...	590 yards.	
	Duration	G. Hayden ...	137 secs.	
Single screw, rise off ground	Distance	W. E. Evans ...	290 yards.	
	Duration	W. E. Evans ...	64 secs.	
Twin screw, do. ...	Distance	L. H. Slatter ...	365 yards.	
	Duration	J. E. Louch ...	2 mins. 49 secs.	
Single-tractor screw, hand-launched	Distance	C. C. Dutton ...	266 yards	
	Duration	J. E. Louch ...	91 secs.	
Do., off-ground	Distance	C. C. Dutton ...	190 yards.	
	Duration	J. E. Louch ...	94 secs.	
Single screw hydro., off-water	Duration	L. H. Slatter ...	35 secs.	
Single-tractor, do., do.	Duration	C. C. Dutton ...	29 secs.	
Twin screw, do., do.	Duration	L. H. Slatter ...	60 secs.	
Engine driven off grass	Duration	D. Stanger ...	51 secs.	

Exhibition at the Anglo-American Exhibition.—The Aviation Section of this exhibition has stall room for a few more models, especially hydro-aeroplanes, but these should if possible have suitable floats for display in tanks. Full details will shortly be published of the competitions to be held in connection with this section. Any member or reader wishing to loan a model should apply to Col. H. S. Massy, Administration Office, Anglo-American Exhibition, Shepherd's Bush.

Channel Crossing.—An attempt to cross the Channel will be made by two members of the kite section during the summer in a small boat towed by kites. This will be done to demonstrate the seaworthiness of the new folding "Bapo" boat which Major B. Baden-Powell has specially designed for hydro-aeroplanes.

International Meeting.—Will all endeavour to do their best to obtain support for this meeting. The French clubs have stated that they will send representatives from at least 6 associations to compete and it is hoped that other countries will do likewise. The trophies promised to date are the *Car Illustrated* trophy and the Shell trophy.

27, Victory Road, Wimbledon.

W. H. AKEHURST, Gen. Hon. Sec.

Mr. C. L. Pratt's Olympia Steam Plant.

This plant is substantially the same as that of Mr. Groves. The tanks are the same, with the exception of dimensions, partitioned in the centre, one side benzolene and the other water. The water pump is geared down to 5 to 1, and the oil feed to 50 to 1. The oil feed gear is obtained by a 10 to 1 worm off the water pump shaft. The amount of steel tubing used is about 12 ft. of tubing in the boiler, and it weighs 11 ozs. The engine cylinders have $\frac{1}{2}$ in. bore by $\frac{1}{2}$ in. stroke, and are constructed of german silver and the crank-case of steel. Each piston has two rings made of gun metal. The ends of the cylinders and the steam feed pipes are all silver soldered, as well as the cylinders, into the crank-case. The engine, complete with valve chest and propeller nut, weighs just $6\frac{1}{2}$ ozs., and the whole plant together 2 lbs. $4\frac{1}{2}$ ozs. without fuel. At the flying trials at Hendon the plant apparently was working well, but the model made no actual flight owing to reasons already referred to in these columns. At the Aero Motor Trials at the East London Technical College the plant was not, we believe, subjected to an actual test owing to pump trouble.

Mr. D. A. Pavely's Olympia Steam Plant.

This plant, unlike that of Mr. Pratt, is pressure fed; the engine is a 3-cylinder one of the rotary type, $\frac{7}{16}$ -in. bore, $\frac{1}{16}$ -in. stroke. The boiler contains 6 ft. of $\frac{3}{16}$ -in. steel tubing. The propeller is 16-in. diameter and 20-in. pitch. The weight of the machine, minus the planes, with fuel is 2 lbs. 6 ozs. The wheels are 3.5-in. Clarke's disc. Each longitudinal consists of two pieces of birch, laminated $\frac{1}{8}$ in. by $\frac{1}{2}$ in. The skid is laminated bamboo. The covering round the reservoir tanks is aluminium. The valves are needle ones. The wheels are rubber sprung. We do not so far know any of the results obtained with this plant.

A New Model Association for Nottingham.

A new Model Association has recently been formed in Nottingham under the title of the "Nottingham Scientific Model and Experimental Association." The Association embraces practically all kinds of models, and the following sections, amongst others, are represented:—Model aeroplanes, sailing yachts, power boats, steam, gas, and petrol engines, scale locomotives and electrical appliances and apparatus. Although the Association has only been in existence a few weeks, the membership at the time of writing is between 40 and 50, including a number of the members of the late Nottingham Society of Model Engineers.

Lord Henry Bentinck, M.P., has kindly consented to become the first President of the Association, and a number of influential gentlemen in the city and district have signified their willingness to accept office as Vice-Presidents. Lectures on a variety of scientific subjects have already been arranged, and it is hoped in due course to secure a workshop in a convenient part of the city for the use of the members. It is also proposed to offer awards for meritorious work turned out by the members. The annual subscription has been fixed at a particularly low figure, namely, 4s., and 2s. for juniors under 21. The Hon. Secretary, Mr. P. M. MacColl, of 2, Park Street, Beeston, Notts, will be pleased to answer enquiries from any of our readers who may be desirous of joining the Association.

AFFILIATED MODEL CLUBS DIARY AND REPORTS.

CLUB reports of chief work done will be published monthly for the future. Secretaries' reports, to be included, must reach the Editor on the last Monday in each month.

Bath and Somerset Aero Club (199, WELLSWAY, BATH).

MEMBERS of this club will visit Bristol on July 18th, to compete in a great competition held in connection with the International Exhibition and under the auspices of the Bristol and West of England Aero Club.

Monthly Report.—At the last meeting of the club, held on the 15th inst., it was decided to affiliate to the K. and M.A.A. Mr. R. C. Cross' club record of 85 secs., has been raised by him to 95 secs. The same member has also had flights of over a minute on several occasions with r.o.g. model, the machine climbing to a great height and showing great stability in strong wind. Mr. C. Jennings' twin-screw mono. flew right out of sight and was lost. Messrs. Knight, Lewis, Tolman, Brampton and Pickett all making rapid strides both in construction and flying. It is hoped to shortly start the construction of a new glider based on the results of the last one, which was attacked and destroyed by a cow.

Leytonstone and District Aero Club (64, LEYSPRING ROAD).

MAY 31ST, flying on Wanstead Flats at 6.30 a.m. R.o.g. duration competition at 10.30 a.m.; 8-oz. models, 4-oz. loading. June 7th, similar competition to above. Models must rise off grass.

Monthly Report.—May 3rd, on Wanstead Flats, Messrs. F. Wood and W. Hersom were flying, at 6.30 a.m., r.o.g.s. with good durations. Messrs. Wharnsby and Wood h.l. models. H. Bedford and H. Green were obtaining good flights with tractor models, and F. E. Grattan averaging 50 secs. with a single-propeller model. Flying this model at Nazing the previous week Mr. Grattan averaged about 80 secs, and obtained one flight of 100 secs. May 3rd, at 10.30 a.m., four r.o.g.s. were in evidence, Mr. C. Hersom averaging 60 secs., F. Wood 65, W. Hersom 66, and T. Kimpton 65. H.l. models were flown by F. Wood and Osborne. Mr. Bedford was again flying his tractor and Mr. F. Grattan his single-propeller. May 10th, there was a good meet of members, and two hydros. were flown; one a tractor by W. Hersom, the other the usual

twin-screw by F. Wood. Both flew well. Mr. H. Bedford was getting an average of 63 with an r.o.g. off rough grass. Messrs. Wharnsby and Osborne flew h.l. models. May 17th, Messrs. Bedford and Bond brought out 8-oz. r.o.g.s. with 6-oz. loading. Mr. Bedford's average for nine flights was 83 secs., Mr. Bond 74. Four 8-oz. r.o.g.s. with 4-oz. loading were flown; the averages for three or more flights being: F. Wood, 85 secs.; T. Kimpton, 87 secs.; S. C. Hersom, 66 secs.; and H. Bedford, 65 secs. Mr. Wharnsby also flew a r.o.g. Tractors were flown during the morning by C. Hersom, W. Hersom and H. Bond. Mr. Osborne flew a biplane. May 24th, Mr. H. Bond was again flying his 8-oz. r.o.g. with 6-oz. loading and averaging 54 secs. F. Wood could only get 40 secs. with his r.o.g. 4-oz. loading. Wharnsby, with r.o.g., 35 secs. H.l. models were flown by T. Kimpton and F. Wood. After flying, Mr. W. Hersom's compressed air plant underwent some satisfactory bench tests in the club-room.

Paddington and Districts (77, SWINDERY ROAD, WEMBLEY).

MEMBERS will please note that the usual flying ground will now be closed for a few weeks until the grass is cut. A temporary ground on Mr. Perkins' farm is available to those members who wish to use same.

Monthly Report.—Less flying than usual has been done by members this month owing to adverse winds, the best performances being by Mr. T. Carter with his tractor monoplane. May 9th, Mr. W. E. Evans, after one good flight with his 8-oz. twin-propeller Olympia monoplane, landed it in a tall tree. May 16th, some good flights by Messrs. R. Bird, T. Carter, M. Levy, F. W. Johnson, H. Woolley and W. E. Evans, the latter testing single-screw Olympia model with larger plane and elevator and with various propellers. His best durations were 51, 53 and 56 secs. Mr. M. Levy was testing a long single-screw monoplane with fair success.

Reigate, Redhill and District (THE COTTAGE, WOODLANDS AVENUE, REDHILL).

Monthly Report.—During the month a fair amount of flying has been done, and members have been busy in workshop with machines for forthcoming Rawson Cup Competition. Mr. Sutton has been doing some experimental work with different tractor screws on his Olympia tractor, getting about 30 secs. finishing always with a good glide. On the 29th, he was out with his J. W. B. type tractor, longest flight 168 yds.; this is a triangular fuselage, not covered in, and is heavier loaded than Olympia tractors; it has now been handed to Mr. Hooton, a younger member, to learn something from. On the 16th, Messrs. Sutton, Hooton, Funnell and Hoyle were out; there was a high wind blowing, and Mr. Sutton's tractor was displaying its inherent stability with credit. He was experimenting with Olympia floating tail r.o.g., placing fin in different positions, including under line of thrust. Mr. Hooton was getting high flights with h.l. mono. best about 300 yds. Mr. Funnell 40 to 45 secs. with 8-oz. r.o.g. mono., afterwards looping with same. Mr. Hoyle was getting over 60 secs. with his Olympia r.o.g. mono.; this is always reliable, and he has some good propellers. Messrs. S. G. and R. G. Wilson have been out with a 10-oz. floating tail r.o.g. mono., getting best 59 secs., also 40 to 45 with 6-oz. floating tails. On the 20th, Messrs. S. G. Wilson, Key, Norton, Sutton, Hooton, Funnell and Hoyle were out, the event of the evening being Messrs. Key's, Norton's, and Sutton's Olympia tractors, which were to be observed for club records. They were being continually flown for two hours without mishap, and were flying to perfection, being steered at will to left or right by rudder. Mr. Sutton set up a record of 33 secs. for duration, and Mr. Norton a record of 165 yds., after circling, for distance; many flights were gauged so that they circled and landed on Golf Green, from whence they started, thus a splendid view was obtained of the landing, which was perfect. Spectators were deeply interested, staying all the time flying was in progress, which is not usual when only models of the "stick" specie are being flown. Messrs. Kennard and Young have been flying experimental machines, and are also building for Rawson Cup.

Sheffield Ae.C. (41, CONISTON ROAD, ABBEYDALE, SHEFFIELD).

MAY 30TH, hydro-aeroplane contest, 4.30 p.m. June 6th, 3 p.m., demonstration by Mr. Gumpert at Standhouse Aerodrome with 4-ft. compressed air monoplane; also novices h.l. and record raising.

Monthly Report.—May 2nd, at Intake, the contest for the cup and silver medal given by Mr. E. W. Colver for r.o.g. machines in very gusty winds. Master C. Dewsnap proved the winner with 8½ secs. duration. Mr. W. H. Bagshaw's machine on its second trial flight flew upside-down for about 100 yds. Misfortune overtook Mr. Bagshaw on his last trial, his machine vanishing at the end of 78 secs. He was awarded the second prize of a bronze aviation medal. Mr. E. S. Elliott acted as judge, Mr. W. Bagshaw (sen.) and Mr. Cudworth as observers. May 15th, general meeting at Broomheads, when Mr. E. W. Colver presented another cup to the club for competition for the purpose of bringing out further scientific developments in aviation with power-driven machines, other than rubber or spring motors. The cup is to be competed for by home-made power plants and machines, and is to be open to all England, but the competitors must be members of the K. and M.A.A. It will be competed for the first time on August Bank Holiday, and the rules, &c., governing same will be announced later. Mr. Colver was heartily thanked for his very generous gift by all the members. This is the third cup which has been presented by him, besides numerous other prizes given to the club. Messrs. E. W. Colver, C. F. W. Cudworth, W. H. Bagshaw (sen.) and Mr. H. Slack were elected as official observers. May 16th, tractor biplane contest for the silver aviation medal presented by Mr. Marcus D. Manton. Master C. Dewsnap proved the winner with 168 ft. 5 ins. straight.

South-Western Aero Club (373, BRIXTON ROAD, S.W.).

Monthly Report.—A meeting was held on May 2nd, when the club was constituted and the officers elected, with a committee. It was decided that the entrance fee should be 2s. 6d. The workroom is stocked with all materials, &c., for model making, these being supplied at reduced rates, rubber, of course, included. The club is indebted to the president, Mr. Prodder, for the club premises, while the vice-president, Mr. A. H. Aloof, has kindly offered to provide any more tools above the club's present stock that are necessary. It is hoped that the club will shortly be in possession of a private flying ground; negotiations for same are now in progress. The hon. sec. will be pleased to hear from anyone in the S.W. district interested in aviation, and will be glad to provide any further information to intending members. Mr. Prodder, Jun., has been flying a twin-screw floating tail model in Brockwell Park, obtaining between 30 and 40 secs. Mr. Miller has had out a 7-oz. tractor, which flies well and shows great stability. Mr. Drake's Laing tractor put up a 90 secs. flight at Wimbledon, the average of six flights being 76 secs. each. Most of the members are busy making machines for the club *brevet* tests, for which a formula—design and construction × duration—will be used.

Wimbledon and District (165, HOLLAND ROAD, W.).

MAY 30TH and 31st, flying as usual. June 1st, handicap competition for r.o.g. machines at 3.30.

Monthly Report.—During the past month there has been a good deal of flying, and several new machines have been out. The most interesting event was the remarkable success of Mr. D. Laing's new tractor. This machine was first out

on May 2nd, and on May 3rd it broke the h.l. duration record for tractors with a flight of 102 secs., during which it rose to a height of about 80 ft., finishing with a splendid glide. Mr. Laing then turned his attention to hydros, and on the evening of the 9th this machine had its first trials on the water, making several short flights. The following day it was flying extremely well, rising with and against the wind, and finishing up with a fine flight of 58 secs., constituting a club record for tractor hydros. Messrs. Boniface and Tucker have had out new tractors of similar design, flying very high and averaging 50 secs. duration. Mr. Hayden has been experimenting with a new twin-screw machine, the span of which is equal to the length, viz., 4 ft., and the loading of which is 6 ozs. It climbs very well, but as yet no good glides have been obtained, and the duration does not exceed 60. Mr. Powell's Olympia twin-screw has also been flying high, doing great distances, on one occasion being lost over the woods, but recovered. Mr. Davies, however, was not so lucky when his machine disappeared in the same direction, for it has not been seen since.

Windsor Model and Gliding Club (10, ALMA ROAD.).

Monthly Report.—The summer season has started with some fine model flying, Messrs. S. Spicer, E. Stanbrook, F. Camm, S. Camm, S. Dandridge and J. E. Rogers taking part. The machines used were mostly tractors, this type easily outdoing the propeller machine in flying and efficiency. Two of the machines were of exceptional interest, these being F. Camm's, "Antoinette," and E. Stanbrook's Weiss type. Both models weighed over the pound, and also exceeded 4 ft. in span. Some splendid flights were obtained. Mr. S. Dandridge has finished his steam plant, and will now begin testing it. There is some extremely fine work embodied in it, and it is altogether a very creditable piece of work. It will be fitted into a machine of the tractor class, Etich type. Extremely satisfactory progress has been made with the full-sized machine. The fuselage is very nearly erected, only the assembling of the various members remaining. The construction adopted for the fuselage, has exceeded expectations, a very rigid and light structure resulting. The chassis is of the wheel and skid type. Quite a lot of work will have to be done on the engine, it being intended to fit new bearings and gudgeon pins. From the foregoing it will be seen that the building of the machine will soon be an accomplished fact. This is very gratifying when one thinks of the humble origin of the club. It is hoped that those members who have been somewhat lax in their attendances of late will kindly make known their intentions in regard to the future. Mr. A. A. Somerville, M.A., has kindly consented to give a donation towards the fund, and is also taking a great interest in it. Any persons in the locality who would like to assist in the work, should visit the workshops any evening during the week.

UNAFFILIATED CLUBS.

Bedford and District Model Ae.C. (22, PARK AVENUE, BEDFORD).

MR. B. C. HUCKS will give a demonstration of "looping the loop" and upside-down flying on the Polo Ground, Amptill Road, on June 12th and 13th. Special arrangements for admission, &c., are being made for members. A flying meeting will be held on the Putnoe Lane Ground, Kimbolton Road, on Sunday, June 7th. Flying starts at 11.30 sharp. Distance and duration competitions for r.o.g. models have been arranged. The club extends a cordial welcome to non-members at their meetings.

Monthly Report.—The club, which has only recently been started, has now earnestly started work. On May 17th the club held a very successful meeting. The *pièce de résistance* was the flying of Mr. C. L. Matson's twin r.o.g. with swept back wings. It was with this model that Mr. Matson successfully raised the Stony Stratford Model Club's record for r.o.g. distance and duration at Flitwick some weeks ago. Much amusement was caused by one bashful member bringing the club linoleum rising gear to the flying ground, together with his models in a bath chair, carefully covered with a green dust sheet. Mr. W. R. Bowick had out a single-propeller pusher h.l. monoplane and a twin-propeller hollow spar h.l. model. He obtained some very good durations with the former, which showed excellent stability. Mr. Conyers had a small tractor monoplane, which showed itself quite an adept in the art of "looping" and "tail sliding." Mr. T. S. Williams had out an A frame with swept back main plane, which is quite fast. Several models are in course of construction, among which may be mentioned Mr. Robinson's scale Blériot (1 in. to 1 ft.), to which one understands a rotary engine of his own invention for compressed air or steam is to be fitted. Mr. Bowick is making a scale Morane, to be driven by a rubber motor. Members are requested to send their annual subscription (2s. 6d.) to the hon. sec. at their earliest convenience. The club pamphlets, &c., will have by this time gone to press. Anyone interested in model aviation in this district is invited to make application for club pamphlets and other literature to the hon. sec. at the above address.

Birmingham Aero Club (8, FREDERICK ROAD, EDEGBASTON).

JULY 4TH, competition for Club's Challenge Shield for the Championship of England. Entry fee for non-members, 1s. July 25th, a model competition for Championship of the Midlands. Entry fee for non-members, 1s. A silver medal is given for this event. Both the above competitions take place on the club's aerodrome at Billesley, Yardley Wood Road.

Burton and District Aero Club. (156, SHOBNAIL ROAD.)

A WATERPLANE contest is being held by the club on Whit Monday.

Monthly Report.—Competitions held on Good Friday. Duration: 1st, H. Robinson, 36 secs.; 2nd, C. G. Lamb, 28 secs. Distance: 1st, H. Robinson, 250 yds.; 2nd, C. G. Lamb, 220 yds. Junior event. Duration: 1st, H. Robinson; 2nd, W. Makin. R.o.g. event abandoned owing to strong wind. Silver medal first prize in each event. F. Robinson made the finest flight yet made by a club machine. C. Lamb with his single, 6 ft. 9 ins. in length and 4 ft. 9 ins. across wings, 15-in. propeller driven by 18 strands of $\frac{1}{4}$ elastic, has had some remarkable flights. May 20th saw the best turn-out of the club, G. C. Robinson, C. G. Lamb, H. Robinson, F. Dowson, flying singles, H. F. Metcalf, F. Robinson, J. Starbuck, B. Donaldson and H. Robinson flying twin machines. Col. R. F. Ratcliff has given a silver cup, and the Marquess of Anglesey a silver challenge shield for waterplanes. There is now every inducement to join up, as only members of Midland clubs will be eligible to compete.

Finsbury Park and District (66, ELFORT ROAD, HIGHBURY, N.).

JUNE 6TH, h.l. duration contest for tractor Models at Finsbury Park, 4.30 p.m.

Monthly Report.—Mr. S. Gibbs out with Etich tractor also D.F.W. biplane, which showed great stability, A. Richards with Deperdussin mono., B. H. Barnard, Blériot type with working controls, R. Mullin, twin-screw canard. Mr. S. Gibbs raised the distance record for r.o.g. tractors to 390 ft. off rough grass on May 9th. The r.f.g. tractor duration contest on May 9th, resulted as follows:—S. Gibbs, 1st, average 25 secs.; A. Richards, 2nd, average 20 secs.; B. H. Barnard, 3rd, average 17 secs.; these were made off rough grass in very windy weather. May 16th, Mr. A. Richards up with tractor mono. own design, S. Gibbs, Etich mono., B. H. Barnard, Etich mono., working controls; H. Mullin, with twin screw, canard-type machine, all flying well. Competition programme for 1914 now ready, and will be sent on application.

Ilford Model Ae.C. (83, ENDSLEIGH GARDENS, ILFORD).

MAY 30TH, flying as usual at "Aerodrome," Hog Hill, Hainault Forest, Chigwell Row, at 9.30 a.m. (weather permitting). June 7th, "Second Competition" meeting, 9.15 a.m. sharp (weather permitting). Prize offered by Messrs. Charles and Co., coal merchants, of Ilford, will be competed for. Club records:—Twin propeller over 42 ins., r.o.g., 76½ secs., Mr. G. Warren, May 17th; twin propeller over 42 ins., h.l., 69½ secs., Mr. G. Warren, May 3rd; single propeller over 36 ins., r.o.g., 61½ secs., Mr. A. F. Lazell, May 17th; twin propeller ("lightweights") under 30 ins., r.o.g., 49 secs., Mr. J. L. Hartnoll, April 5th; twin propeller ("lightweights") under 30 ins., h.l., 51½ secs., Mr. J. L. Hartnoll, March 29th.

Monthly Report.—Owing to the Easter holidays no "official" flying meeting took place, however several members attended. April 10th, Messrs. B. Seabright and J. P. Leggett out testing machines. The former took out an A frame—successful flights obtained. Mr. Leggett's T frame, hollow-spar did some exceedingly good flights, finally lodging on top of a tall tree, which (the machine) was recovered a week later no worse for being exposed to the wind and rain storms. April 11th, Messrs. B. Seabright and J. P. Leggett out testing more machines. Mr. Leggett had the misfortune to smash his large "hollow-spar" fuselage monoplane through the walls of the spar being too thin and weak. April 12th, Mr. B. Seabright's A frame obtained 50 secs. Mr. R. C. Nicholls' "Lizzie" biplane flew exceedingly well and was exceedingly fast. His average flights were roughly 45 secs. Mr. J. L. Hartnoll's "lightweight" flew in its usual grand style, obtaining an average of about 50 secs. Mr. R. C. Nicholls unfortunately smashed his "single pusher" early in the morning, so was unable to demonstrate its real flying capabilities. Mr. J. P. Leggett, with a new hollow-spar fuselage monoplane, flew excellently well. Mr. E. Jenkinson's small "looper" could not be persuaded to loop. His "gull-wing-shaped" propellers seem to be very efficient though they "rev." a trifle too fast. April 13th, Mr. B. Seabright obtained 51 secs. Mr. J. L. Hartnoll's "lightweight" "r.o.g.-ed" in splendid style and flew very well indeed. Miss L. M. Johnson put in her first appearance with an A frame monoplane which obtained very good results. Mr. A. Tapper brought out a machine composed of bits of scrapped machines, some being of the lamented "Lizzie" which is lying in hospital. Mr. E. Jenkinson's machine was not very successful owing to its weight, and being underpowered. April 19th, Mr. G. Warren's huge monoplane obtained 58½ secs. The redoubtable (not to mention repaired) "Lizzie" once more showed itself, it simply "roars" up to between 100 and 150 ft. and flies for about 50 secs. Mr. E. Jenkinson at last persuaded his small "looper" to loop. Mr. J. L. Hartnoll's wonderful little "lightweight" flew exceedingly well. Mr. J. P. Leggett's "Wobbler" flew very well. Mr. A. F. Lazell smashed his machine. Mr. G. Warren's flew very well. Mr. R. C. Nicholls easily obtained the ¼ mile. April 26th, Mr. G. Warren obtained 63½ secs. His machine looks splendid, being doped with "Cellon." Messrs. G. Warren, B. Seabright, and R. C. Nicholls got their machines up to about 200 ft., and others flying were Mr. E. Jenkinson with his "looper." Mr. J. P. Leggett, Mr. F. Kappey (twin "pusher") and Mr. S. B. Potter. May 17th, the "First Competition Meeting." Results:—Senior section. Event I. Twin "pushers" over 42 ins., r.o.g.: 1st, Mr. G. Warren, 76½ secs., marks, 185; 2nd, Mr. B. Seabright, 135½. Event II. Single "pushers" over 36 ins., r.o.g.: 1st, Mr. G. Warren, 46½ secs., marks, 155½; 2nd, Mr. A. F. Lazell, 118½. Event III. Open handicap, h.l., 1st Mr. G. Warren, 65 secs., marks 192½; 2nd Mr. A. F. Lazell, 173½. Junior section. Owing to the poor number of entries only one event was held. Event I. Open handicap, h.l.: 1st, Mr. J. L. Hartnoll, 37½ secs., marks, 76½; 2nd, Mr. J. L. Hartnoll, 65½. Messrs. E. Jenkinson, J. P. Leggett, T. Hyett, R. C. Nicholls, F. Kappey, H. Triggs, and A. W. Yelton obtained some very good flights. Judges for above competition: Messrs. H. Corrigan, F. M. Connellan, and J. B. Fitzsimons. Timekeeper: J. B. Fitzsimons. Any one wishing to join the above club should communicate with the hon. sec. immediately, addressed, Mr. J. B. Fitzsimons, hon. sec., I.M.Ae.C., 83, Endsleigh Gardens, Ilford, Essex.

Liverpool Aero Research Club (62, CEDAR GROVE, LIVERPOOL).

Monthly Report.—The Model Aero Exhibition held at the Y.M.C.A. Hall, Mount Pleasant, on May 2nd, proved exceedingly successful. T. W. Bennett exhibited two r.o.g. floating tail machines of excellent finish, fitted with detachable chassis of a very clever design, together with a 30-in. span r.o.g. "canard," and an h.l. 1-1-0-P2 with swept back planes, the workmanship being a pleasure to look upon, a feature worth noting being a movable vane on the 30-in. canard, intended to aid in setting the model dead-on to the wind, enabling a cleaner set-off, an ingenious contrivance that took the fancy of many. This member holds a very fine set of kites, having on show a ¼ full size Cody man-lifting kite, a winged box kite just on 6 ft. long of his design for signalling purposes, four hawk kites ranging from 8 ft. 6 ins. downwards, and a good array of others; an exhibition that put the finishing touch to the show. The G. H. Kilshaw exhibit included a large scale military divided tail mono., 5 ft. 8 in. span, a new feature being the *ailerons* placed beneath the main planes, a 4-ft. tractor r.o.g. monoplane (3 member fuselage), a neat tractor biplane, 30-in. span (4 members, half covered in fuselage), two r.o.g. twin-screw canards, 33 and 26 ins. span respectively, two h.l. 1-1-0-P2, a 26-in. span twin r.o.g. floating tail mono., and a propeller testing apparatus for testing propeller thrust; a most variable exhibit in all. W. Beale showed three machines, a twin h.l. biplane canard, divided lower plane, a diminutive r.o.g. 12-in. span tractor, and a large r.o.g. tractor, 33-in. span, the main plane designed on the gliding gull-wing principle, giving the machine a distinctively graceful appearance. The B. Tear exhibit, besides showing an h.l. twin canard and an h.l. pusher canard biplane, had on view a neatly built r.o.g. 1-1-0-P2 wings, an elevator built on the Dunne principle, in addition to a fine scale model Antoinette, 5 ft. 4 ins. span; a most commendable exhibit. W. F. Woods showed a large model glider, covered in fuselage, 36-in. span, and M. Payne a large h.l. tractor. J. Kilshaw showed an r.o.g. canard, E. Kay exhibiting a twin canard r.o.g. biplane and a tractor r.o.g. mono., conspicuous for the absence of vertical surfaces. E. Kilshaw showing a 24-in. span, r.o.g. tractor, 26-in. r.o.g. canard mono., and one h.l. 1-1-0-P2. Mr. W. P. Thomson, after judging for design and construction, spoke most highly of the exhibits, remarking that this show easily eclipsed anything held in Liverpool by previous clubs, regretting the absence of the ornithopter type of model; the secretary's regret, however, being the absence of hydroplane models. The Aero Research Trophy has been won by Mr. T. W. Bennett, for his extensive exhibits, May 2nd, also gaining the hand-painted diploma for kites. G. H. Kilshaw being awarded the "Diploma of Merit." Next quarter the Aero Research Trophy will be awarded in a competition for r.o.g. machines, covered in fuselage, any type. Further particulars to be published later. This should prove a most scientific contest. May 9th, members out testing "show" models. B. Tear and T. W. Bennett making some good flights towards the close, the latter finishing proceedings with a fine high flight with a large h.l. back swept wing canard machine. May 16th, members were in attendance at the Drill Hall, Edge Lane, where the club had on view the greater part of the previous exhibition models. The G.H.K. 6-ft. "warplane" (divided tail), on this occasion fitted with floats, forming a very attractive machine: C. Kirby's 1-1-0-P2 r.o.g. being an extra addition. This show was arranged in aid of a

prominent local Scout Cadet Corps. May 23rd, contests for exhibition prizes took place at Stanley Park, and provided a lively meeting, Mr. A. G. Pugh timing in the two events. Result:—H.l. machines: 1st prize, T. W. Bennett, 49 points; 2nd prize, G. H. Kilshaw, 25; 3rd, B. Tear, 19½. R.o.g. machines: 1st prize, T. W. Bennett, 29 points; 2nd prize, G. H. Kilshaw, 25½; 3rd, E. Kilshaw, 20. The weather was by no means ideal for model display, and Mr. Bennett in carrying off the two first prizes fully deserves his win, his consistency in the h.l. competition being great. It has, in all, been a busy month, and members are to be congratulated on the good show they have made.

S. Eastern Model Ae.C. (1, RAILWAY APPROACH, BROCKLEY).

MAY 30TH, Woolwich Common, 3.30 p.m. until dusk. May 31st, Blackheath, 6.30 to 10 a.m.

Monthly Report.—After a very busy winter members are looking forward to an equally busy summer—if the weather permits. Mr. W. Rowland Ding, who is already well known in connection with the Ding-Sayers aeroplanes, and who has recently purchased a 100 h.p. Handley-Page biplane, and Mr. H. H. Groves, the popular exponent of steam-driven aeroplanes, have been elected vice-presidents. The club considers itself extremely fortunate in obtaining two such practical men to strengthen its efforts to popularise model-aviation as a science and not merely a pastime. To enumerate individually the members who have been flying models this past month would be too tedious, but appended are the names of those who have been extremely energetic, or who have obtained the most noteworthy results. R.o.g. tractors flown by Messrs. Arthur and Charles Beere, F. W. Edwards (double-surfaced planes), G. H. Westwood, whose model, not unlike "Mary's lamb," can be trusted to take care of itself whatever the atmospheric conditions; A. D. Nicholls with a very realistic machine, A. F. Chinnery, whose large "Etrich" type mono., has made some of the best flights ever secured from so big a model driven by an elastic motor; and most successful results from a geared mono. have been obtained by S. Hunt. Splendid flights from twin-propeller machines have rewarded the efforts of Messrs. H. H. Groves, F. Plummer, F. Dixon, F. W. Edwards, R. W. Prance, G. H. Westwood, and A. D. Nicholls, but extraordinary flights have been accomplished by A. B. Clark's twin-propeller hollow-spar monoplane, fitted with elevator and floating tail, the chief features being the height at which they are made and the magnificent glide with which they terminate. This model's exhibitions have been described in the local press as "the acme of spectacular flying." Amongst those who have been deservedly successful with single propeller machines may be mentioned W. Jones, whose model has an extremely high factor of efficiency, Messrs. McLaughlin, Rippon, and Barnett, the latter's mono. being fitted with a tail in addition to the orthodox elevator. One of the renowned "Gnat" single propeller models has been flown by H. G. Wilkinson, with extremely satisfactory results. It has been decided to institute a series of club duration records, open to all types of r.o.g. or water models, and it is hoped that members will at once set about "making the fur fly." They would, however, be well advised to confine their efforts to scientific models and not build special record-breaking "flying-sticks." Entries are now being received for this quarter's "Trophy" competition, and they should be sent to the hon. sec. at the above address. He will also be pleased to answer any enquiries, or to acknowledge subscriptions. A social aeromodellists' club is now being formed in East Dulwich, and residents who are interested in aviation, or who would like to see more model flying in their vicinity, are requested to kindly communicate with Mr. G. Greenwood Bentley, at "Mableton," 5, Waveney Avenue, Peckham Rye.

St. John's Model Ae.C., Hensingham (Hon. Sec., J. J. POSTLETHWAITE, 19, BEDFORD STREET, HENSINGHAM, WHITEHAVEN).

Monthly Report.—On May 16th, the members held their first flying meeting at the club's flying ground, Egremont Road, Hensingham. The best flights of the day were obtained by the secretary with his A frame monoplane. Only two flights were timed, one 30 secs., and the other 35 secs. Meetings are held on alternate Friday evenings and Saturday afternoons, and the members would be very pleased to see anyone interested in models. The club has already had a model and a medal presented for competition, and a beginners' competition for the model is now in progress.

Twickenham and District (74, CLIFDEN ROAD, TWICKENHAM).

MAY 30TH, 31st, and on June 1st, meeting for the "May" prizes at Whitton Park. Flying at Whitton Park in the evenings as usual this next week.

Monthly Report.—During this month much flying has been done, and a general improvement has been noticed, both in the construction and in the actual flights of the machines. May 2nd, Messrs. Maynard, Franklyn, Stagg, Williams, Ord, Whyte and Rice-Skinner with tractors, also Messrs. Ferry, Maynard, Ord and Whyte out with "pusher types." May 3rd, all the above out with their respective machines, also Mr. Digby, a new member. May 6th, 10th, Messrs. Maynard, Stagg, Franklyn, Ord and Whyte, Ferry and Williams flying. Messrs. Maynard and Ferry flying out of sight with their "pusher types." After a diligent search they were discovered in some orchards. Also Messrs. Barnes and Harries out with new tractors. May 16th, 17th, all last week's members out. Mr. Stagg experimenting with single prop. machine, good durations obtained, also Mr. Franklyn out with "single-sticker." May 23rd, 24th, not much flying, too wet. Nevertheless Messrs. Stagg, Franklyn, Whyte, Maynard and Rice-Skinner out with a few machines. At the weekly meetings (indoor) this month, Mr. Stagg read a paper on the "Evolution of Flight," Mr. Williams on the "Pioneers of the Air," and the secretary on Bird Flight. The club badges are now to be had, and members who have not taken their *brevets* should do so as soon as possible, so as to be qualified for the badges.

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